



Town of Rowley

Bridge Inventory Evaluation

JUNE 2019



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1. Introduction

The purpose of this report is to evaluate the bridge inventory of the Town of Rowley and provide a prioritized list of structures recommended for repair or replacement. This report also provides cost estimates for prioritized repairs one 1-year, 5-year, and 10-year time horizons to help plan for capital bridge improvements. These recommendations are based on the state of the bridge inventory as of December 2018 as observed in the field.

2. Background

The federal government created the National Bridge Inspection Standards (NBIS) in 1968 which established requirements for the inspection of all bridges including frequency, personnel qualifications, inspection reports, and inspection procedures. The NBIS apply to all structures defined as bridges.

2.1 Bridge definitions

The Federal Highway Administration (FHWA) defines a **bridge** as:

“A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.”

A **culvert** is defined as:

“A structure designed hydraulically to take advantage of submergence to increase hydraulic capacity. Culverts, as distinguished from bridges, are usually covered with embankment and are composed of structural material around the entire perimeter although some are supported on spread the streambed serving as the bottom of the culvert. Culverts may qualify to be considered “bridge” length.”

Structures meeting the above criteria are generally referred to as “NBI structures”. Any structures not meeting the above criteria are considered “non-NBI structures”. Non-NBI structures are outside the jurisdiction of the NBIS.

Massachusetts defines a bridge as any structure greater than 10 feet in length using the same measurement criteria as in NBIS. Structures greater than 10 feet in length but less than 20 feet in length have the designation as BRI as the bridge category code. Structures greater than 4 feet in length but less than 10 feet in length are considered culverts regardless of actual structure type. These structures are designated as CUL structures. BRI or CUL refers to the Bridge Category Code.

2.2 Inspection Requirements

According to the NBIS, bridges must be inspected every 24 months unless conditions warrant a more frequent inspection interval or written permission is obtained to extend the interval to a maximum of 48 months. Certain data must be collected during each inspection and reported to the Federal Government for bridges in the NBI.

Under Massachusetts General Laws (M.G.L.) Chapter 85 Section 35, MassDOT is required to determine the safe load carrying capacity of all municipally owned bridges. This cannot be determined without a bridge inspection and therefore MassDOT is responsible for the inspection

of all municipally owned NBI structures. Inspection findings are provided in the form of hard copy reports. MassDOT however, is not responsible for the regular inspection of non-NBI structures.

According to Section 8 of the MassDOT Bridge Inspection Handbook, MassDOT will inspect non-NBI structures as staffing levels permit. NBI structures and MassDOT owned structures are given priority over municipally owned structures.

Below is a link to the MassDOT Bridge Inspection Handbook for further information:

<http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/BridgeInspectionHandbook.aspx>

2.3 Inspection Reports

The inspection reports contain a description of each structure and an evaluation of each component of the structure including deck, superstructure, substructure, approaches, stream channel, etc. Each component is given a numerical Condition Rating as well a description of any deficiencies. The deficiencies are categorized by severity and urgency of repair. The reports will also contain pictures and summaries of the deficiencies noted.

2.3.1 Condition Ratings

The condition of each bridge component is rated on a scale of 0-9 with 9 being the best rating and 0 being the poorest rating. In general, a rating of 7-9 indicates the component is in “good” condition, a rating of 5-6 indicates the component is in “fair” condition and a rating of 0-4 indicates the component is in “poor” condition. Refer to an inspection report for a more detailed description of each numerical rating.

2.3.2 Deficiency Definitions

Structure components exhibiting deficiencies are categorized first by the severity of the deficiency and second by the urgency of the repair required. The categories of deficiencies are “Minor”, “Severe/Major”, “Critical Structural”, and “Critical Hazard”. Refer to an inspection report for a more detailed description of each category. The urgency of repairs are defined by “Immediate”, “ASAP”, and “Prioritize”. The definitions of each are below and also on each inspection report:

Immediate (I) – Inspectors immediately contact District Bridge Engineer (for MassDOT) and receive further instruction.

ASAP (A) – Action should be initiated by Responsible Party (owner) upon receipt of the Inspection Report.

Prioritize (P) – Shall be prioritized by Responsible Party (owner) and repairs scheduled when funds/manpower is available.

2.3.3 Inspection Types

2.3.3.1 Routine Inspections

Routine inspections are used to determine the general condition of a structure. They are “hands-on” inspections, meaning each component is inspected up close.

2.3.3.2 Underwater Inspections

Underwater inspections are performed on substructures units in water. Depending on water depth, a dive team may be required to assess the condition of the substructure. These inspections should be performed every 36 to 60 months.

2.3.3.3 Fracture Critical Inspections

Fracture Critical Inspections are performed on structures containing fracture critical members. Fracture Critical Members are defined as steel members in tension or with a tension element, whose failure would be expected to cause a portion or the entire structure to collapse. These inspections are performed at the same time as the routine inspections following procedures specific to each bridge. The procedures are kept on file for each bridge by MassDOT.

2.3.3.4 Special Member Inspections

Special member inspections are performed when a major bridge component (deck, superstructure, substructure) has an overall rating of 4 or lower. If the overall rating is a 4, the inspection frequency of the entire structure is reduced to 12 months. If the overall rating is 3, the inspection frequency is reduced to 6 months.

2.3.3.5 Freeze/Thaw Inspections

According to the MassDOT Bridge Inspection Manual, freeze/thaw inspections are performed yearly to evaluate exposed concrete elements and ensure deteriorated concrete does not fall onto a travelled way.

3. Town of Rowley Bridge Inventory

3.1 List of Town Owned Bridges

Below are tables listing all Town owned bridges in order by structure identification number (Table 1) and overall worst to best condition (Table 2).

Table 1: By Structure Number

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Overall Condition
1		Bennett Hill Rd.	N/A	Stone	Single Culvert	24" dia.	6
2		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	6
3		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	6
4		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	6
5		Bradford St.	N/A	Pipe (Clay)	Single Culvert	24" dia.	6
6		Central St.	N/A	Granite Slabs/30" CMP at outlet	Single Culvert	48" W x 30" H	6
7		Central St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	5
8		Central St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	6
9		Christopher Rd.	N/A	Pipe (Metal)	Single Culvert	36" dia.	7
10		Cross St.	N/A	Concrete/Granite	Slab	63" W x 48" H	7
11		Cross St.	N/A	Pipe (Metal)	Single Culvert	24" dia.	6
12		Daniels Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	5
13		Dodge Rd.	N/A	Pipe (Clay)	Single Culvert	28" W x 15" H	3
14		Dodge Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	7
15		Dodge Rd.	N/A	Pipe (Metal)	Double Culvert	2 - 12" dia.	5
16	R11005	Dodge Rd.	Mill River	Concrete	Arch-Deck		7
17	R11002	Glen St.	Mill River	Concrete	Arch-Deck		4
18		Haverhill St.	N/A	Pipe (Metal)	Single Culvert	24" dia	5
19		Haverhill St.	N/A	Pipe (HDPE)	Single Culvert	18" dia	6
20		Haverhill St.	N/A	DS Pipe (Metal) US pipe (Plastic)	Single Culvert	24" dia	5
21		Haverhill St.	N/A	Concrete	Single Culvert	24" dia	4
22		Haverhill St.	N/A		Single Culvert		
23		Haverhill St.					
24		Haverhill St.	N/A	Concrete	Single Culvert	30" dia.	5
25		Haverhill St.	Mill River	TBD	TBD	TBD	

 Good

 Fair

 Poor

Town of Rowley: Bridge Inventory Evaluation

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Overall Condition
26		Hillside St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	7
27		Hillside St.	N/A	Pipe	Single Culvert	Could not measure	4
28		Independent St.	Ox Pasture Brook		Opened Bottom Arch	44" W x 24" H	4
29		Newbury Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	7
30		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	12" dia.	7
31		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	unknown	5
32		Pleasant St.	N/A	not visible	Single Culvert	Could not measure	5
33		Prospect St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	8
34		School St.	N/A	Masonry/Concrete	Single Culvert	50" W x 50" H	6
35		Summer St.	N/A	Pipe (Concrete/Clay)	Single Culvert	24" dia. Clay @ inlet, 36" dia. Conc. @ outlet	7
36		Turcotte Mem. Dr.	N/A	Pipe (Concrete)	Double Culvert	2 - 46" dia.	8
37		West Ox Pasture Ln.	N/A	Pipe (Poly)	Single Culvert	12" dia.	8
38		Wethersfield St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	5
39	R11008	Wethersfield St.	Mill River	Concrete	Frame		8
40	R11009	Wethersfield St.	Batchelder Brook	Concrete	Frame		7
41		Wethersfield St.	N/A				
42		Wilkes Rd.	N/A	Pipe (Concrete)	Double Culvert	2-15" dia.	8
43		Spencer Knowles Rd.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	8
44		Wethersfield St.	N/A	Pipe (Poly)	Single Culvert	14" dia.	6
45		Haverhill St.	N/A		Single Culvert	12" est.	6
46		Haverhill St.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	6
47		Boxford Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	5
48		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	6
49		Wilkes Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	6
50		Cindy Ln.	N/A	Pipe (Concrete)	Triple Culvert	3 - 30" dia.	7
51	R11007	Glen St. Ext.	Mill River	Masonry	Arch-Deck		7
52	R11006	Mill Rd.	Mill River	Steel	Girder		4

Table 2: By Condition Rating, worst to best

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Overall Condition
13		Dodge Rd.	N/A	Pipe (Clay)	Single Culvert	28" W x 15" H	3
17	R11002	Glen St.	Mill River	Concrete	Arch-Deck		4
21		Haverhill St.	N/A	Concrete	Single Culvert	24" dia	4
27		Hillside St.	N/A	Pipe	Single Culvert	Could not measure	4
28		Independent St.	Ox Pasture Brook		Opened Bottom Arch	44" W x 24" H	4
52	R11006	Mill Rd.	Mill River	Steel	Girder		4
7		Central St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	5
12		Daniels Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	5
15		Dodge Rd.	N/A	Pipe (Metal)	Double Culvert	2 - 12" dia.	5
18		Haverhill St.	N/A	Pipe (Metal)	Single Culvert	24" dia	5
20		Haverhill St.	N/A	DS Pipe (Metal) US pipe (Plastic)	Single Culvert	24" dia	5
24		Haverhill St.	N/A	Concrete	Single Culvert	30" dia.	5
31		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	unknown	5
32		Pleasant St.	N/A	not visible	Single Culvert	Could not measure	5
38		Wethersfield St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	5
47		Boxford Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	5
1		Bennett Hill Rd.	N/A	Stone	Single Culvert	24" dia.	6
2		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	6
3		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	6
4		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	6
5		Bradford St.	N/A	Pipe (Clay)	Single Culvert	24" dia.	6
6		Central St.	N/A	Granite Slabs/30" CMP at outlet	Single Culvert	48" W x 30" H	6
8		Central St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	6
11		Cross St.	N/A	Pipe (Metal)	Single Culvert	24" dia.	6
19		Haverhill St.	N/A	Pipe (HDPE)	Single Culvert	18" dia	6
34		School St.	N/A	Masonry/ Concrete	Single Culvert	50" W x 50" H	6
44		Wethersfield St.	N/A	Pipe (Poly)	Single Culvert	14" dia.	6
45		Haverhill St.	N/A		Single Culvert	12" est.	6
46		Haverhill St.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	6

 Good

 Fair

 Poor

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Overall Condition
48		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	6
49		Wilkes Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	6
9		Christopher Rd.	N/A	Pipe (Metal)	Single Culvert	36" dia.	7
10		Cross St.	N/A	Concrete/Granite	Slab	63" W x 48" H	7
14		Dodge Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	7
16	R11005	Dodge Rd.	Mill River	Concrete	Arch-Deck		7
26		Hillside St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	7
29		Newbury Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	7
30		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	12" dia.	7
35		Summer St.	N/A	Pipe (Concrete/ Clay)	Single Culvert	24" dia. Clay @ inlet, 36" dia. Conc. @ outlet	7
40	R11009	Wethersfield St.	Batchelder Brook	Concrete	Frame		7
50		Cindy Ln.	N/A	Pipe (Concrete)	Triple Culvert	3 - 30" dia.	7
51	R11007	Glen St. Ext.	Mill River	Masonry	Arch-Deck		7
33		Prospect St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	8
36		Turcotte Mem. Dr.	N/A	Pipe (Concrete)	Double Culvert	2 - 46" dia.	8
37		West Ox Pasture Ln.	N/A	Pipe (Poly)	Single Culvert	12" dia.	8
39	R11008	Wethersfield St.	Mill River	Concrete	Frame	24" dia.	8
42		Wilkes Rd.	N/A	Pipe (Concrete)	Double Culvert	2-15" dia.	8
43		Spencer Knowles Rd.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	8
22		Haverhill St.	N/A		Single Culvert		
23		Haverhill St.	Batchelder Brook				
25		Haverhill St.	Mill River	TBD	TBD	TBD	
41		Wethersfield St.	N/A				

3.2 Functionally Obsolete/Structurally Deficient Bridges

The FHWA tracks bridges considered Functionally Obsolete or Structurally Deficient.

3.2.1 Definitions

Functionally Obsolete – This term describes a structure that is not suitable for its current use. There are a number of reasons a bridge may be functionally obsolete including shoulder width, lane width, barrier type, approach geometry, etc.

Structurally Deficient – This term describes a bridge with a rating of a major component (deck, superstructure, substructure) of a 4 or below. Bridge owners typically make repairs to structurally deficient bridges as soon as possible so they can be removed from the list.

3.3 Overview of Town Owned NBI Bridges (*Span length > 20 ft.*)

All NBI bridges owned by the Town are inspected on a regular basis by MassDOT with condition ratings reported to the federal government. The evaluations below are based on information contained in the latest available MassDOT Inspection Report.

R-11-005 Dodge Road over Mill River



BRIDGE TYPE Arch-deck with concrete

WEARING SURFACE Asphalt

RAILING TYPE

UPSTREAM Concrete Parapet

DOWNSTREAM Concrete Parapet

OVERALL CONDITION 7

NOTES See MassDOT Inspection Report

R-11-008 Wethersfield Street over Mill River



BRIDGE TYPE Concrete frame

WEARING SURFACE Asphalt

RAILING TYPE

UPSTREAM Concrete Parapet

DOWNSTREAM Concrete Parapet

OVERALL CONDITION 8

NOTES See MassDOT Inspection Report

R-11-009

Wethersfield Street over Batchelder Brook



BRIDGE TYPE Concrete frame

WEARING SURFACE Asphalt

RAILING TYPE

UPSTREAM Metal Bridge Railing

DOWNSTREAM Metal Bridge Railing

OVERALL CONDITION

7

NOTES See MassDOT Inspection Report

3.4 Overview of Town Owned non-NBI Bridges (Span length between 10 ft. and 20 ft.)

All non-NBI bridges owned by the Town should be inspected on a regular basis by MassDOT. Because the condition of these structures is not required to be reported to the federal government, these structures are inspected if MassDOT resources are available. The evaluations below are based on information contained in the latest available MassDOT Inspection Report.

R-11-002 Glen Street over Mill River



BRIDGE TYPE Arch-deck with concrete

WEARING SURFACE Asphalt

RAILING TYPE

UPSTREAM Concrete Parapet

DOWNSTREAM Concrete Parapet

OVERALL CONDITION 4

NOTES See MassDOT Inspection Report

R-11-007 Glen Street Extension over Mill River



BRIDGE TYPE Masonry Arch

WEARING SURFACE Asphalt

RAILING TYPE

UPSTREAM None

DOWNSTREAM None

OVERALL CONDITION 7

NOTES See MassDOT Inspection Report.
Bridge is currently privately owned.

R-11-006
Mill Road over Mill River



BRIDGE TYPE Steel Girder

WEARING SURFACE Asphalt

RAILING TYPE Concrete parapet with chain link fence

OVERALL CONDITION 4

UPSTREAM None

DOWNSTREAM None

NOTES See MassDOT Inspection Report

3.5 Overview of other Town Owned Structures

Structures with span lengths less than 10 ft. are considered culverts and are not inspected by MassDOT. VHB visited each structure and the evaluations below are based on field assessments of each structure. Approximate street address shown in ()

1. Bennett Hill Road (22)



BRIDGE TYPE	Single culvert–Stone
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Difficult access due to vegetation
IMMEDIATE NEEDS	Remove vegetation from channel

2. Boxford Road (38)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Clean culvert of sediment, and channel of debris and vegetation.
IMMEDIATE NEEDS	Culvert is almost full of sediment, dry laid stone headwalls satisfactory

3. Boxford Road (238)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	SDS headwall has 5" +/- tree growing on top. Both stone headwalls have loose or settled stones.
IMMEDIATE NEEDS	Clean debris from channel; remove tree at downstream headwall; rebuild both headwalls.

4. Boxford Road (326)



BRIDGE TYPE	Single culvert with poly pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Plastic pipe is generally in a good condition, but damaged in upstream end. No headwalls. Loose stone laid on downstream end.
IMMEDIATE NEEDS	Clear vegetation and debris; monitor undermining at pipe ends.

5. Bradford Street (53)



BRIDGE TYPE	Single culvert with clay pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Un-grouted masonry headwall and channel outlet. Inlet headwall is failing (un-grouted stone). Pipe is half filled with sediment. Pavement is in poor condition.
IMMEDIATE NEEDS	

6. Central Street (23)



BRIDGE TYPE	Single Culvert with granite slabs/30" CMP at outlet
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Guardrail
DOWNSTREAM	Wood
OVERALL CONDITION	6
NOTES:	Rusting and section loss at inlet. Partial collapsing of outlet headwall (missing stones). Flooding issues due to heavy rain.
IMMEDIATE NEEDS	

7. Central Street (151)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	Wood
OVERALL CONDITION	5
NOTES:	Headwall at outlet is leaning. Inlet at pond on private property.
IMMEDIATE NEEDS	Grout stones at outlet headwall. Remove debris.

8. Central Street (293)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Corrosion and section loss for first 5' of pipe. Headwalls are concrete.
IMMEDIATE NEEDS	

9. Christopher Road (47)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	7
NOTES:	Vertical crack appears in downstream headwall. Inlet is on private property.
IMMEDIATE NEEDS	

10. Cross Street (12)



BRIDGE TYPE	Slab with concrete/granite
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wire
DOWNSTREAM	Wood
OVERALL CONDITION	7
NOTES:	Masonry abutment with granite slab. Last 5' at downstream end is concrete abutments and slab.
IMMEDIATE NEEDS	

11. Cross Street (84)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Some crushing of pipe appears at outlet (could have been at construction). Grouted masonry appears at inlet; dry stacked masonry appears at outlet.
IMMEDIATE NEEDS	

12. Daniels Road (25)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	Wood
OVERALL CONDITION	5
NOTES:	Bank erosion appears at downstream. Downstream headwall and wingwall appear to have collapsed.
IMMEDIATE NEEDS	Rebuild downstream headwall and wingwall.

13. Dodge Road (22)



BRIDGE TYPE	Single culvert with clay pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	3
NOTES:	Appears headwall, wingwalls, and pipe have collapsed at outlet. Depression occurs in road above pipe.
IMMEDIATE NEEDS	Replace

14. Dodge Road (77)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	7
NOTES:	Riprap slope at inlet, perched outlet. Minor erosion of outlet bank.
IMMEDIATE NEEDS	

15. Dodge Road (149)



BRIDGE TYPE	Double culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	5
NOTES:	Gaps in stones at inlet and outlet. Perched outlet, bottom of pipe with 100% section loss for approx. 3' (water does not flow out end of pipe)
IMMEDIATE NEEDS	

18. Haverhill Street (43)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	5
NOTES:	Downstream end of pipe is rusted with minor section loss. Wingwalls are spalled and cracked. Upstream pipe is not visible. Headwall condition is poor with spalling and sink hole behind.
IMMEDIATE NEEDS	Rebuild upstream headwall

19. Haverhill Street (62)



BRIDGE TYPE	Single culvert with HDPE pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Pipe is in a good condition. Downstream stone headwall is in a good condition. Concrete upstream headwall has some spalling.
IMMEDIATE NEEDS	Clean debris at portals.

20. Haverhill Street (89)



BRIDGE TYPE	Single culvert with metal pipe (downstream) and plastic pipe (upstream)
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	None
OVERALL CONDITION	5
NOTES:	Upstream headwall in fair condition with some spalling. Roadway drains directly over headwall. Downstream headwall has minor spalling.
IMMEDIATE NEEDS	Repair upstream headwall

21. Haverhill Street (223)



BRIDGE TYPE	Single culvert with concrete
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	None
OVERALL CONDITION	4
NOTES:	Upstream headwall is in a good condition. Downstream headwall has failed.
IMMEDIATE NEEDS	Rebuild downstream headwall.

22. Haverhill Street (112)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	
NOTES:	Upstream (N) is very heavily vegetated. Access is limited to obtain info on the culvert. Channel appears to drop upon entering upstream. Could not find downstream portal.
IMMEDIATE NEEDS	Clear vegetation up stream for better access. Scope upstream portal.

23. Haverhill Street over Batchelder Brook (312)



BRIDGE TYPE	Single culvert with HDPE pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	
NOTES:	Culvert completely submerged.
IMMEDIATE NEEDS	Re-inspect during lower flow period.

24. Haverhill Street (713)



BRIDGE TYPE	Single culvert with concrete
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	5
NOTES:	Upstream pipe submerged in water, not visible. Mortared stone headwall is in a good condition. Downstream pipe is 90% full. Stone headwall has failed.
IMMEDIATE NEEDS	Repair downstream headwall.

25. Haverhill Street over Mill River (851)



BRIDGE TYPE	TBD
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	
NOTES:	Due to high water and heavy debris, culvert was not visible at either end.
IMMEDIATE NEEDS	Revisit culvert during period of low flow to better identify.

26. Hillside Street (60)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	7
NOTES:	Concrete headwall and wingwalls at inlet. Masonry at outlet. Floods frequently.
IMMEDIATE NEEDS	

27. Hillside Street (170)



BRIDGE TYPE	Single culvert with pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	4

NOTES: Inlet and outlet headwalls have completely collapsed.

IMMEDIATE NEEDS Rebuild headwalls.

28. Independent Street over Ox Pasture Brook (40)



BRIDGE TYPE	Opened bottom arch
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Guardrail
DOWNSTREAM	Guardrail
OVERALL CONDITION	4

NOTES: Erosion appears behind headwall and wing at inlet and outlet. Partial collapse of upstream wingwalls. Un-grouted masonry. Fills up during heavy rain but no overtopping.

IMMEDIATE NEEDS Reconstruct headwall and wingwall; remove debris.

29. Newbury Road (164)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	7
NOTES:	Inlet is steel grate and drop inlet. Outlet to riprap apron and field. Asphalt on top is rutted and patched.
IMMEDIATE NEEDS	

30. Newbury Road (204)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	7
NOTES:	Un-grouted masonry headwall and wingwalls at inlet and outlet. (drying during field visit)
IMMEDIATE NEEDS	

31. Newbury Road (259)



BRIDGE TYPE	Single culvert with metal pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	5
NOTES:	Inlet headwall is missing. Outlet headwall is not visible. Riprap slopes around outlet.
IMMEDIATE NEEDS	Uncover inlet and outlet.

32. Pleasant Street (49)



BRIDGE TYPE	Single culvert
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood
DOWNSTREAM	None
OVERALL CONDITION	5
NOTES:	Headwall at outlet has collapsed. Inlet is partially blocked with sediment.
IMMEDIATE NEEDS	Repair headwall and remove sediment.

33. Prospect Street (35)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Low stone parapet
DOWNSTREAM	Low stone parapet
OVERALL CONDITION	8
NOTES:	Grouted masonry headwall and wings.
IMMEDIATE NEEDS	

34. School Street (36)



BRIDGE TYPE	Single culvert with masonry/ concrete
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood
DOWNSTREAM	Wood
OVERALL CONDITION	6
NOTES:	Headwall at inlet is leaning outwards. Some need of repointing. Cracks in asphalt.
IMMEDIATE NEEDS	Repair sidewalk, downstream side.

35. Summer Street (67)



BRIDGE TYPE	Single culvert with concrete/clay pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	Wood
OVERALL CONDITION	7
NOTES:	Minor erosion appears behind inlet wingwall. Additional 15" dia. Conc. Pipe at outlet from nearby drop inlet.
IMMEDIATE NEEDS	

36. Turcotte Memorial Drive (8)



BRIDGE TYPE	Double culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood guardrail
DOWNSTREAM	Wood guardrail
OVERALL CONDITION	8
NOTES:	North pipe is blocked with debris.
IMMEDIATE NEEDS	

37. West Ox Pasture Ln. (45)



BRIDGE TYPE	Single culvert with poly pipe
WEARING SURFACE	Compacted Stone
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	8
NOTES:	Recently installed structure. Riprap slopes.
IMMEDIATE NEEDS	

38. Wethersfield Street (256)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood guardrail
DOWNSTREAM	Wood guardrail
OVERALL CONDITION	5
NOTES:	No pointing at outlet. Dislodged stones at inlet headwall, no pointing.
IMMEDIATE NEEDS	Remove trees behind headwall; rebuild inlet headwall.

41. Wethersfield Street

Culvert is being replaced in 2018.

42. Wilkes Road (29)



BRIDGE TYPE	Double culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Conc. Parapet with metal rail
DOWNSTREAM	Conc. Parapet with metal rail
OVERALL CONDITION	8
NOTES:	Pipes at base of back-to-back retaining walls are supporting road.
IMMEDIATE NEEDS	

43. Spencer Knowles Road (28)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Conc. Parapet with metal rail
DOWNSTREAM	Conc. Parapet with metal rail
OVERALL CONDITION	8
NOTES:	Minor cracks appear in parapet.
IMMEDIATE NEEDS	

44. Wethersfield Street



BRIDGE TYPE	Single culvert with poly pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Drains wetlands area. Dip in road over pipe. Un-grouted stones for headwall.
IMMEDIATE NEEDS	

45. Haverhill Street (414)



BRIDGE TYPE	Single culvert
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	6
NOTES:	Downstream (N) portal is submerged in water; headwall fair; upstream portal appears to be CB.
IMMEDIATE NEEDS	Clean DS channel.

46. Haverhill Street (908)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Metal guardrail
DOWNSTREAM	Metal guardrail
OVERALL CONDITION	6
NOTES:	Upstream (N) portal is submerged in water; headwall fair; downstream pipe is about 1/2 full of heavy debris.
IMMEDIATE NEEDS	Clean debris from pipe and DS channel.

47. Boxford Road (139)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	5
NOTES:	DS Stone headwall has large tree and roots growing over it.
IMMEDIATE NEEDS	Remove tree at DS headwall and re-set stones. Clean channel of debris.

48. Boxford Road (151)



BRIDGE TYPE	Single culvert with poly pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	None
OVERALL CONDITION	6
NOTES:	Pipe is in a good condition, no headwall downstream.; upstream headwall meets satisfactory.
IMMEDIATE NEEDS	Clear vegetation and debris. Pipe is in a good condition, no headwall downstream.; upstream headwall meets satisfactory.

49. Wilkes Road (5)



BRIDGE TYPE	Single culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	None
DOWNSTREAM	Wood
OVERALL CONDITION	6
NOTES:	Debris appears at inlet and no headwall. Stone headwall at outlet. (Dry during field visit)
IMMEDIATE NEEDS	Remove debris from inlet.

50. Cindy Lane (5)



BRIDGE TYPE	Triple culvert with concrete pipe
WEARING SURFACE	Asphalt
RAILING TYPE	
UPSTREAM	Wood guardrail
DOWNSTREAM	Wood guardrail
OVERALL CONDITION	7
NOTES:	Vegetation growing between pipes and on slopes.
IMMEDIATE NEEDS	Remove vegetation growing between pipes.

4. Recommendations for Prioritized Repairs

The recommended repairs have been prioritized and categorized into 1-year, 5-year, and 10-year time horizons. In addition, deficiencies that do not affect the structural integrity of the structure yet still should be repaired are prioritized but fall into the category of completed as able.

4.1 Repairs to be Completed Within a Year

It is recommended that the structure running beneath Dodge Road be replaced as soon as possible. The road exhibits a large depression over the structure which has been filled/patched multiple times. The depression indicates that the structure has at least partially collapsed. It is recommended that the structure be replaced with a HDPE or concrete pipe of a diameter that matches the hydraulic capacity of the existing structure. It is also recommended that MassDOT standard headwalls are installed at each end of the pipe. Please refer to the attached excerpts from the Construction Standards in Appendix C.

Priority	Town ID No	MassDOT Bridge No.	Feature Carried	Feature Intersected	Recommended Repair	Conceptual Cost Estimate
1	13		Dodge Rd.	N/A	Replace structure	\$34,400

4.2 Repairs to be Scheduled Within 5 Years

The structures listed below are in poor condition and should be considered for repair/replacement. Both structures are greater than 10' in length but less than 20' and therefore qualify for funding under MassDOT's current Small Bridge Program. This program reimburses municipalities up to \$500,000 per year to repair/replace small bridges. Municipalities must submit an application demonstrating the need for the funds with application deadlines twice a year on April 1 and October 1. The program is slated to last 5 years and began in October 2016. These bridges were put into the 5-year time horizon category to take advantage of this funding source.

Bridge R-11-002:

This structure is a concrete arch and was given the following condition ratings from the most recent MassDOT inspection - Superstructure: 4, Substructure: 4, meaning the entire structure is in poor condition. In addition to the condition of the structure itself, undermining of one of the abutments was noted. This means soil has been washed away from beneath the bridge footing. The concrete appears to be crumbling and in poor condition. Major cracks with efflorescence was observed meaning water is flowing through the concrete.

Bridge R-11-006:

This structure consists railroad tracks embedded in a concrete slab on masonry abutments and was given the following condition ratings from the most recent MassDOT inspection – Deck: 5, Superstructure: 4, Substructure: 6, meaning the superstructure is in poor condition. This structure is located on a dead-end unpaved road therefore failure of this structure completely cuts off property access for some residents. It is anticipated that the existing substructures could be rehabilitated, and the superstructure should be replaced.

Priority	Town ID No	MassDOT Bridge No.	Feature Carried	Feature Intersected	Recommended Repair	Conceptual Cost Estimate
1	17	R11002	Glen St.	Mill River	Replace with a precast concrete span	\$796,000
2	52	R11006	Mill Rd.	Mill River	Replace with a precast concrete span	\$488,000

4.3 Repairs to be Scheduled Within 10 Years

It is recommended that the structure listed below be replaced. The wingwalls are failing and there are signs of bank erosion behind the wingwalls. This will eventually lead to erosion of the roadway. Some stones have been dislodged from the dry stacked masonry abutments. The superstructure which appears to consist of granite slabs exhibits cracks. The structure is especially important since it is located near the entrance to the DPW yard and sees heavy truck traffic.

The recommendation to replace this structure in the next 10 years is based on the assumption that funding for the project would need to come from the town's funds (i.e. no state funding) and it will take some time to plan for and save the funds required for the replacement project.

Priority	Town ID No	MassDOT Bridge No.	Feature Carried	Feature Intersected	Recommended Repair	Conceptual Cost Estimate
1	28		Independent St.	Ox Pasture Brook	Replace with a precast concrete span	\$400,000

4.4 Repairs to be Scheduled as Funds/Labor Available

It is recommended that the following list of repairs be completed as funding/town labor forces are available. These deficiencies do not affect the structural integrity of the structure but can impact the performance of the pipe or culvert. In some cases, the roadway which crosses the structure can be subject to erosion where failing headwalls are located close to the edge of the roadway. The repairs are prioritized according to the condition rating given to each.

Repair/Rebuild Headwalls:

It is recommended that where applicable, the headwalls are repaired/replaced in accordance with MassDOT standard construction details shown Appendix C. These could be completed by town forces or by a contractor.

Clear Vegetation/Debris:

Vegetation/debris near the structure inlets and outlets should be removed as recommended below. Vegetation/debris in the stream bed can limit flow and lead to potential flooding issues. When removing debris (such as rocks, logs, and other) care should be taken to not disturb or alter the natural stream bed. Trees growing near the inlets and outlets should be removed. The tree roots can damage the structure headwalls over time. This work can be completed with town forces.

Priority	Town ID No	MassDOT Bridge No.	Feature Carried	Approximate Street Address	Recommended Repair	Conceptual Cost Estimate
1	21		Haverhill St.	223 Haverhill St.	Rebuild downstream headwall	\$7,300
1	27		Hillside St.	170 Hillside St.	Rebuild headwalls	\$18,800
2	7		Central St.	151 Central St.	Grout stones at outlet headwall. Remove debris	\$2,900
2	12		Daniels Rd.	25 Daniels Rd.	Rebuild downstream headwall and wingwall	\$14,200
2	18		Haverhill St.	43 Haverhill St.	Rebuild upstream headwall	\$7,300
2	20		Haverhill St.	89 Haverhill St.	Rebuild upstream headwall	\$7,300
2	24		Haverhill St.	713 Haverhill St.	Rebuild upstream headwall	\$9,400
2	31		Newbury Rd.	259 Newbury Rd.	Uncover inlet and outlet	\$1,200
2	32		Pleasant St.	49 Pleasant St.	Repair headwall, remove sediment	\$12,300
2	38		Wethers-field St.	256 Wethers-field St.	Remove trees behind headwall, rebuild inlet headwall	\$9,000

Priority	Town ID No	MassDOT Bridge No.	Feature Carried	Approximate Street Address	Recommended Repair	Conceptual Cost Estimate
2	47		Boxford Rd.	139 Boxford Rd.	Remove tree at downstream headwall and re-set stones. Clean channel of debris	\$10,400
3	1		Bennett Hill Rd.	22 Bennett Hill Rd.	Remove vegetation from channel	\$1,700
3	2		Boxford Rd.	38 Boxford Rd.	Clean culvert of sediment, and channel of debris and vegetation.	\$4,400
3	3		Boxford Rd.	238 Boxford Rd.	Clean debris from channel, remove tree at downstream headwall, rebuild both headwalls.	\$22,800
3	4		Boxford Rd.	326 Boxford Rd.	Clear vegetation and debris	\$4,400
3	19		Haverhill St.	62 Haverhill St.	Clean debris	\$2,900
3	34		School St.	36 School St.	Repair sidewalk, downstream side	\$5,800
3	45		Haverhill St.	414 Haverhill St.	Clean debris from downstream channel	\$2,900
3	46		Haverhill St.	908 Haverhill St.	Clean debris from pipe and downstream channel	\$2,900
3	48		Boxford Rd.	151 Boxford Rd.	Clear vegetation and debris	\$4,400
3	49		Wilkes Rd.	5 Wilkes Rd.	Remove debris from inlet	\$2,900
3	50		Cindy Ln.	5 Cindy Lane	Remove vegetation growing between pipes	\$2,900

Appendix A

MassDOT Bridge Inspection Reports

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
8BK

INITIAL ROUTINE ARCH & SPECIAL MEMBER INSPECTION

BR. DEPT. NO.
R-11-002

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11002-8BK-MUN-BRI	11-Kilo. POINT 000.080	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUN 20, 2016
07-FACILITY CARRIED HWY GLEN ST	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1850	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Rural Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 111 : Concrete Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER M. Scott	PROJ MGR STV Incorporated
107-DECK TYPE N : Not applicable	WEATHER Sunny	TEMP. (air) 20°C	TEAM MEMBERS A. GOUVEIA, J. MACKENZIE	

ITEM 58	N	
DECK		DEF
1. Wearing surface	6	-
2. Deck Condition	N	-
3. Spandrel Fill	H	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	5	M-P
8. Railing	N	-
9. Anti Missile Fence	N	-
10 Drainage System	N	-
11 Lighting Standards	N	-
12 Utilities	5	M-P
13 Deck Joints	N	-
14	N	-
15	N	-
16	N	-
CURB REVEAL (In millimeters)	E N	W N

ITEM 59	4	
SUPERSTRUCTURE		DEF
1. Arch/Arch Ring	4	M-P
2. Keystone Area	N	-
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	4	M-P
6. Spring Lines	4	M-P
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10 Masonry Joints	N	-
11 Rivets & Bolts	N	-
12 Welds	N	-
13 Deformation/Flattening	N	-
14 Member Alignment	N	-
15 Paint/Coating	N	-
16	N	-
Year Painted	N	
COLLISION DAMAGE: Please explain	None (X) Minor () Moderate () Severe ()	
LOAD DEFLECTION: Please explain	None (X) Minor () Moderate () Severe ()	
LOAD VIBRATION: Please explain	None (X) Minor () Moderate () Severe ()	

ITEM 60	4			
SUBSTRUCTURE		DEF		
1. Abutments	Dive	Cur	4	DEF
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	5		M-P
e. Wingwalls	N	4		M-P
f. Slope Paving/Rip-Rap	N	6		-
g. Pointing	N	N		-
h. Footings	N	5		S-P
i. Piles	N	N		-
j. Scour	N	4		S-P
k. Settlement	N	N		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	DEF
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	DEF
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-
UNDERMINING (Y/N) If YES please explain				Y
COLLISION DAMAGE:	None (X) Minor () Moderate () Severe ()			
I-60 (Dive Report):	N	I-60 (This Report):	4	
93B-U/W (DIVE) Insp	00/00/0000			

APPROACHES		DEF
a. Appr. pavement condition	6	-
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N)	N	
		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

Any Fracture Critical Member: (Y/N) **N**

Any Cracks: (Y/N) **N**

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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ITEM 61 5

CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	N	6	-
2.Embankment Erosion	N	5	M-P
3.Debris	N	N	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	N	-
7.Aggradation	N	N	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low (X) None ()

ITEM 61 (Dive Report): N ITEM 61 (This Report): 5

93b-U/W INSP. DATE:

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	1	5	M-P
B. Transitions	0	4	M-P
C. Approach Guardrail	0	2	S-A
D. Approach Guardrail Ends	0	6	-

WEIGHT POSTING Not Applicable X

Actual Posting: N H 3 3S2 Single

Recommended Posting: N H 3 3S2 Single

Waived Date: EJDMT Date:

Signs In Place (Y=Yes, N=No, NR=Not Required):
 At bridge: N S
 Other Advance: N S

CLEARANCE POSTING

Actual Field Measurement: Not X

Posted Clearance: ft in ft in meter

Signs In Place (Y=Yes, N=No, NR=Not Required):
 At bridge: E W
 Advance: E W

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	Y	Y
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): N Y

Date:

Inspection data at time of existing rating
 | 58: - | 59: - | 60: - Date :00/00/0000

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): Y N

If YES please give priority:
 HIGH () MEDIUM (X) LOW ()

REASON: Never rated.

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
8BK

INITIAL ROUTINE ARCH & SPECIAL MEMBER INSPECTION

BR. DEPT. NO.
R-11-002

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11002-8BK-MUN-BRI	11-Kilo. POINT 000.080	90-ROUTINE INSP. DATE Jun 20, 2016	93*-SPEC. MEMB. INSP. DATE Jun 20, 2016
07-FACILITY CARRIED HWY GLEN ST	MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1850	106-YR REBUILT 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Rural Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 111 : Concrete Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER M. Scott	PROJ MGR STV Incorporated
107-DECK TYPE N : Not applicable	WEATHER Sunny	TEMP. (air) 20°C	TEAM MEMBERS A. GOUVEIA, J. MACKENZIE	

WEIGHT POSTING	<i>Not Applicable</i> <input checked="" type="checkbox"/>	At bridge	Advance	PLANS (Y/N): <input type="checkbox"/> N
Actual Posting	H <input type="checkbox"/> N 3 <input type="checkbox"/> N 3S2 <input type="checkbox"/> N Single <input type="checkbox"/> N	N <input type="checkbox"/> S <input type="checkbox"/>	N <input type="checkbox"/> S <input type="checkbox"/>	(V.C.R.) (Y/N): <input type="checkbox"/> N
Recommended Posting	H <input type="checkbox"/> N 3 <input type="checkbox"/> N 3S2 <input type="checkbox"/> N Single <input type="checkbox"/> N	<input type="checkbox"/>	<input type="checkbox"/>	TAPE#: _____
Waived Date: <input type="text" value="00/00/0000"/>	EJDMT Date: <input type="text" value="00/00/0000"/>	Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility		

RATING	Rating Report (Y/N): <input type="checkbox"/> N Date: <input type="text" value="----"/>	Request for Rating or Rerating (Y/N): <input type="checkbox"/> Y	If YES please give priority: HIGH () MEDIUM (<input checked="" type="checkbox"/> X) LOW ()
Inspection data at time of existing rating I 58: - I 59: - I 60: - I 62: - Date : <input type="text" value="00/00/0000"/>		REASON: <u>Never rated.</u>	

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS (0-9)	PRESENT (0-9)	H-20	3	3S2	
A	Item 59.1 - Arch/Arch Ring	N		See remarks in comments section.		4				M-P
B	Item 59.5 - Spandrel Walls	N		See remarks in comments section.		4				M-P
C										
D										
E										

List of field tests performed:	I-58	I-59	I-60	I-62
	(Overall Previous Condition)	<input type="text" value="-"/>	<input type="text" value="-"/>	<input type="text" value="-"/>
	(Overall Current Condition)	<input type="text" value="-"/>	<input type="text" value="4"/>	<input type="text" value="4"/>

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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REMARKS

The approaches are North and South. The elevations are West and East. The Mill River flows from West to East.

GENERAL REMARKS

The structure is a concrete arch deck bridge. (See sketches #1, #2 & #3) There is a 18" outside diameter utility line in the arch ring underside at spring line which is obstructing channel vertical clearance. Both the North approach and South approach have weight posting restriction signs for 2.5 tons at closest intersections. There are no weight posting signs at the structure.

TEM 58 - DECK

tem 58.1 - Wearing surface

The bituminous wearing surface of the bridge has random areas of transverse cracking. The Southeast edge of pavement has small patched areas and tire wear. (See photo #1)

tem 58.7 - Parapets

The East and West concrete parapets have up to 40% loss of paint coating. The Northwest top section of the parapet is spalled up to 11'-1" long x 12" deep x 3" high with no exposed rebar. (See photos #2 & #3)

tem 58.12 - Utilities

There is a 18" utility pipe in the arch ring that spans between spring lines approximately 62" from South fascia. The pipe ends are grouted into the arch ring in areas up to 40" wide x 35" high. Both grouted patches have widespread deterioration with spalls and delaminated areas. There is a crack in both grout patches that propagates continuously through the arch ring. (See photos #4 & #5)

APPROACHES

Approaches a - Appr. pavement condition

The North approach pavement has areas of map cracking. (See Photo #6)

TEM 59 - SUPERSTRUCTURE

tem 59.1 - Arch/Arch Ring

The arch/arch ring has widespread map cracking with evidence of leakage and efflorescence. The arch ring underside approximately 62" from South fascia has a crack up to +/- 1/4" that starts at the spring line utility pipe grouted patch and continues across the arch ring to the other spring line utility pipe grouted patch. There are cracks up to +/- 1/4" that have propagated off of the main spring line to spring line crack. The arch ring areas near the utility pipe grouted areas have spalled/delaminated up to 20" high x 4" deep. (See photos #7- #8, #12 & #13)

The utility pipe has steel cable supports embedded in the arch ring crown and the concrete around the supports are spalled. (See photo #9)

tem 59.5 - Spandrel Walls

The South spandrel wall near West parapet base has a large spalled area that extends into the Southwest wingwall. Both the East and West spandrel walls have random cracks with efflorescence. (See photo #10)

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REMARKS

The spring line between South breastwall and arch ring has signs of active leakage. The South spring line near East fascia has a spalled area up to 3' long x 4" wide x 1" deep with efflorescence. (See photo #11)

The South spring line near West fascia is spalled up to 65" long x 21" high x 1" deep. (See photo #15)

The North spring line near West fascia is cracked up to 51" long x 1/4" thick. (See photo #12)

Both the North and South spring lines generally have cracking with efflorescence and active leakage at the joint. (See photo #12)

TEM 60 - SUBSTRUCTURE

tem 60.1 - Abutments

tem 60.1.d - Breastwalls

Approximately up to 10' from the West fascia both the North and South breastwalls have widespread map cracking with light to moderate efflorescence and signs of active leakage and delamination. (See photos #13 & #14)

The South breastwall near West fascia has a spall up to 65" long x 21" high x 1" deep with no exposed rebar that extends around the fascia into the Southwest wingwall. (See photo #15)

The South breastwall approximately 7'-4" from West fascia has a crack at the utility pipe patch area that extends down the full height (68") of the breastwall that is up to 1/4" wide and propagates down into the footing. (See photo #13)

Both the North and South breastwall construction joints have hair line cracks with evidence of active leakage and efflorescence. Additionally, both breastwalls have moderate abrasion up to 3' above top of footing.

tem 60.1.e - Wingwalls

The Northeast and Southeast wingwalls have cracks at construction joints with moderate efflorescence. See photos #24 & #25)

The Southwest wingwall has a spall up to 44" long x 81" high x 9" deep with no exposed rebar. (See photo #16)

The Northwest wingwall end has a cracked/broken section with spalled concrete at ground level. (See photo #17)

tem 60.1.f - Slope Paving/Rip-Rap

The Northeast, Southeast and Northwest embankments have minimal rip-rap protection.

The Southwest embankment has bituminous slope pavement due to failed embankment. The pavement is cracked/spalled of at the waterline. (See photo #18)

tem 60.1.h - Footings

Both the North and South footings have areas of exposure that extends up to +/- 26" below the bottom of footing and +/- 33" horizontally undermining the footing due to channel scour. (See chart #1)

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REMARKS

Both the North and South footings have areas of exposure that extend up to +/- 26" below the bottom of the footing and up to +/- 33" horizontal undermining of the footing due to channel scour. Measurements taken along both the North and South footing for scour are provided in attached table. (See chart #1)

SubStructure Undermining Notes

Large areas of undermining were found below the North abutment footing. Starting at West fascia for up to +/- 26' (See chart #1 for measurements).

SubStructure Scour Notes

See Item 60.1.j.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.2 - Embankment Erosion

The Southwest embankment in front of Southwest wingwall is paved with bituminous concrete and the bottom of the embankment at water level is undermining the pavement. (See photo #16)

The Southeast embankment in front of the Southeast wingwall has a tree with its roots fully exposed and very minimal vegetation. (See photo #24)

TRAFFIC SAFETY

Item 36a - Bridge Railing

Both the East and West parapets act as the bridge rail. The Northwest top of parapet is spalled up to 11'-1" wide x 12" deep x 3" high. (See photo #3)

Item 36b - Transitions

Both Northeast and Northwest transitions do not connect to parapet they are terminated before the parapet with steel posts. (See Photos #19 & #20).

The Southeast and Southwest transition rails are two steel wire cables on concrete posts that are fastened to the bridge rail. (See photo #21)

Item 36c - Approach Guardrail

The Southwest approach guardrail run has (3) damaged concrete posts with areas up to 100% section loss of rebar. The posts are bent/broken with lateral displacement up to 2'. (See photos #22)

Item 36d - Approach Guardrail Ends

Both the Southeast and Southwest approach guardrail ends are two steel wire cables buried in the ground. See photo #23)

The Northwest approach guardrail end at access road terminates without a proper end condition. (See photo #19)

Sketch / Chart / Photo Log

- Sketch 1 : Plan View
- Sketch 2 : Cross Section Looking South (@ Crown)
- Sketch 3 : West Elevation

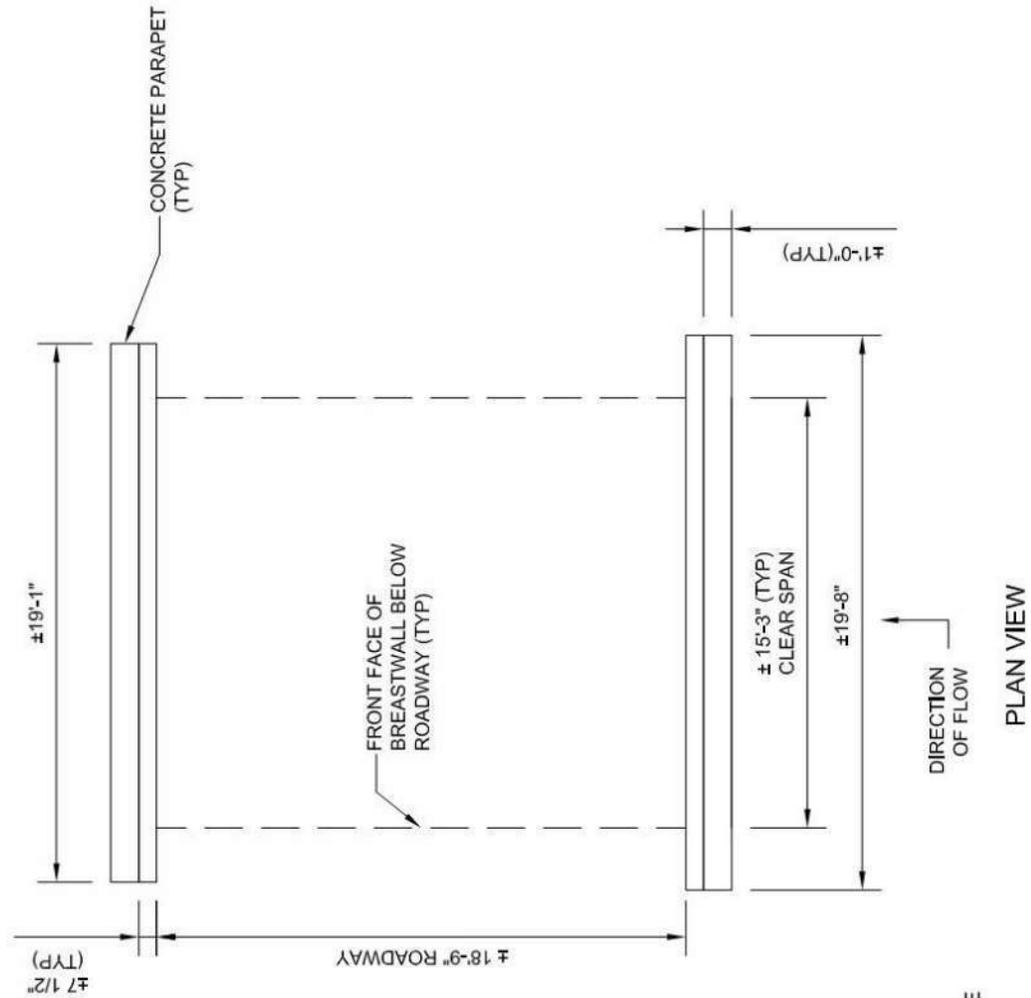
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REMARKS

- ~~REMARKS~~
- Photo 4 : South Spring Line Utility Patch Spall with Crack
 - Photo 5 : North Spring Line Utility Patch Spall with Crack Propagating into Arch
 - Photo 6 : North Approach Pavement with Map Cracking
 - Photo 7 : Northwest Arch/Arch Ring Crack Propagating from Utility Patch
 - Photo 8 : West Arch Underside Crack from Utility Patch to Utility Patch with Cracks Propagating off Main Crack
 - Photo 9 : Typical Utility Support Embedded in Arch with Spall
 - Photo 10 : Southwest Spandrel Wall Spall Under Parapet Extending into Southwest Wingwall
 - Photo 11 : South Spring Line near East Fascia Spring Line Spall with Active Leakage and Efflorescence
 - Photo 12 : North Spring Line Near West Fascia Crack/Spall with Active Leakage
 - Photo 13 : Southwest Breastwall Map Cracking with Efflorescence and Active Leakage
 - Photo 14 : Northwest Breastwall Map Cracking
 - Photo 15 : South Breastwall at West Fascia Spalled Concrete that Extends into Southwest Wingwall
 - Photo 16 : Southwest Wingwall Spall
 - Photo 17 : Northwest Wingwall Cracked/Broken Section
 - Photo 18 : Southwest Embankment Slope Paving that is Cracked/Deteriorated
 - Photo 19 : Northwest Transition Rail Does Not Connect to Bridge Rail (Parapet)
 - Photo 20 : Northeast Transition Rail Does Not Connect with Bridge Rail (Parapet)
 - Photo 21 : Southeast Transition Two Steel Wire Transition Rail
 - Photo 22 : Southwest Approach Two Wire Cable Steel Rail and Concrete Posts Bent/Broken with up to 100% Loss of Section
 - Photo 23 : Southwest Approach Two Wire Cable Steel Guardrail Buried End
 - Photo 24 : Southeast Wingwall
 - Photo 25 : Northeast Wingwall

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SKETCHES

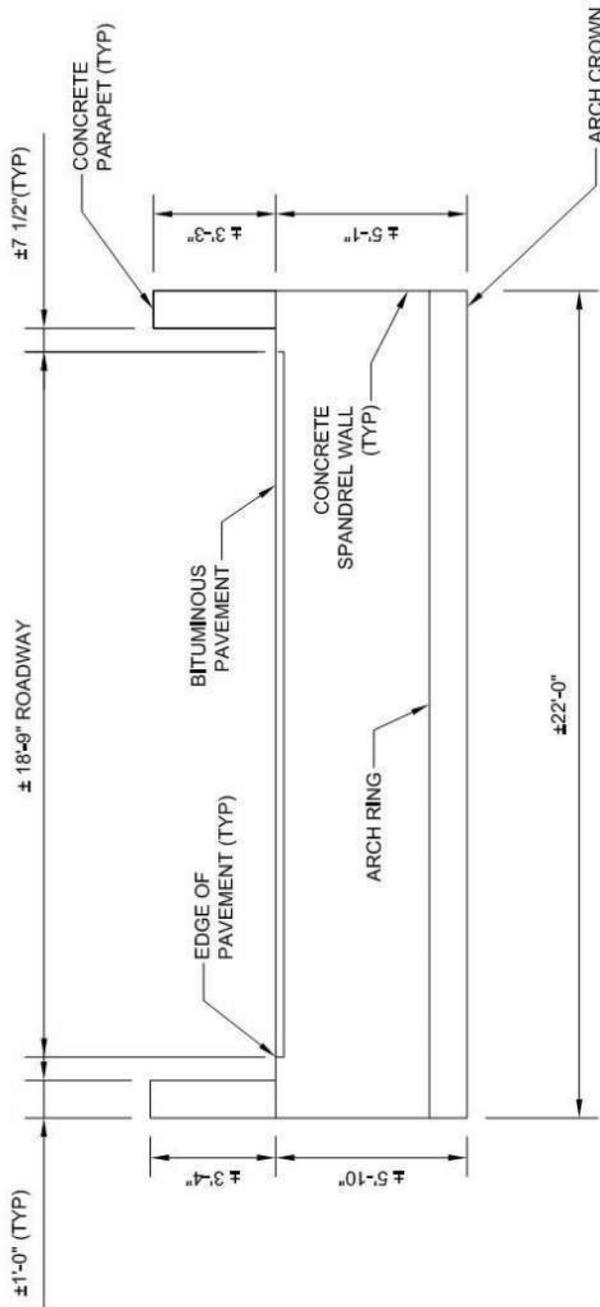


*MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/20/2016.

Sketch 1: Plan View

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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SKETCHES

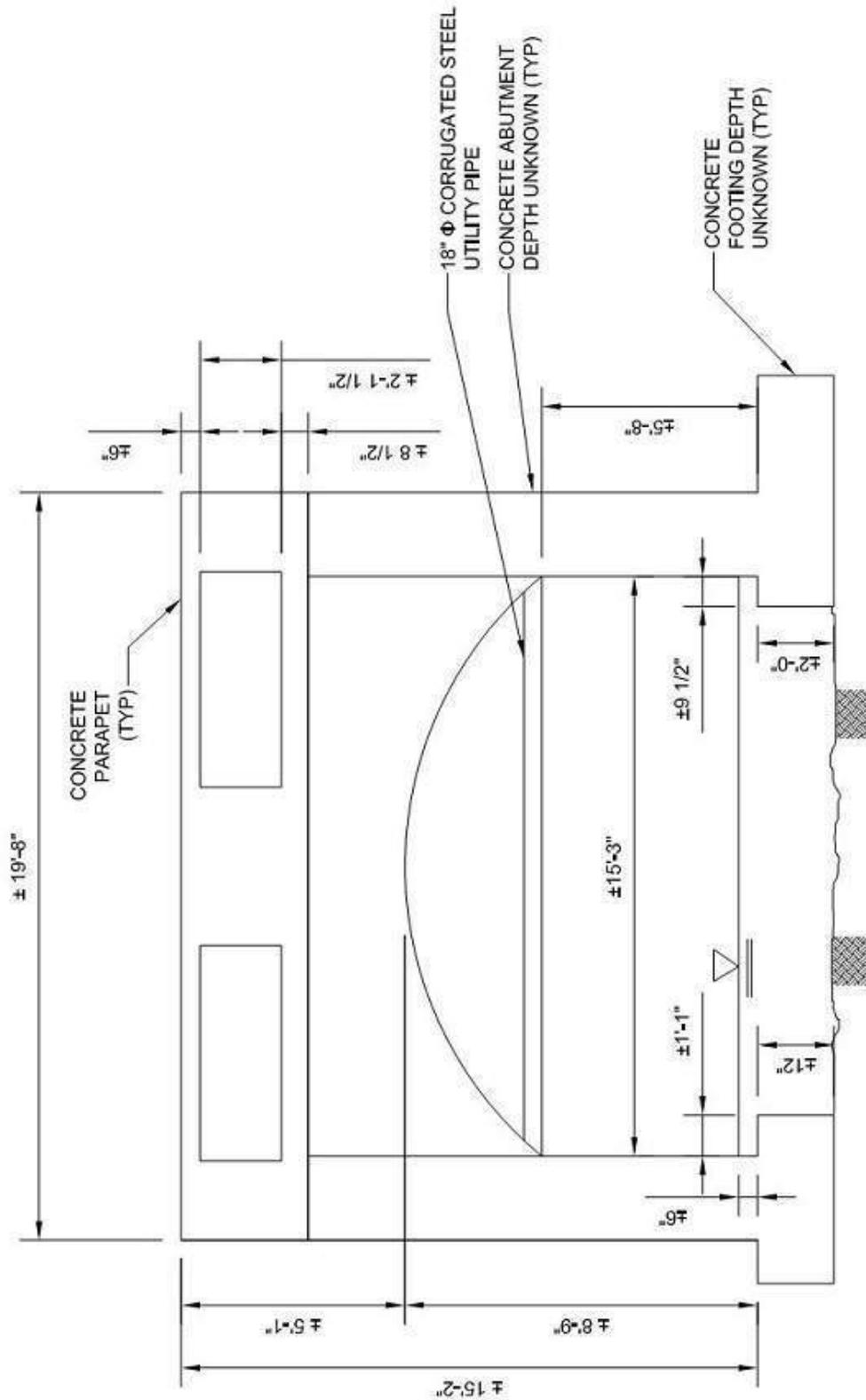


CROSS SECTION LOOKING SOUTH (@ CROWN)
 *MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/20/2016.

Sketch 2: Cross Section Looking South (@ Crown)

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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SKETCHES



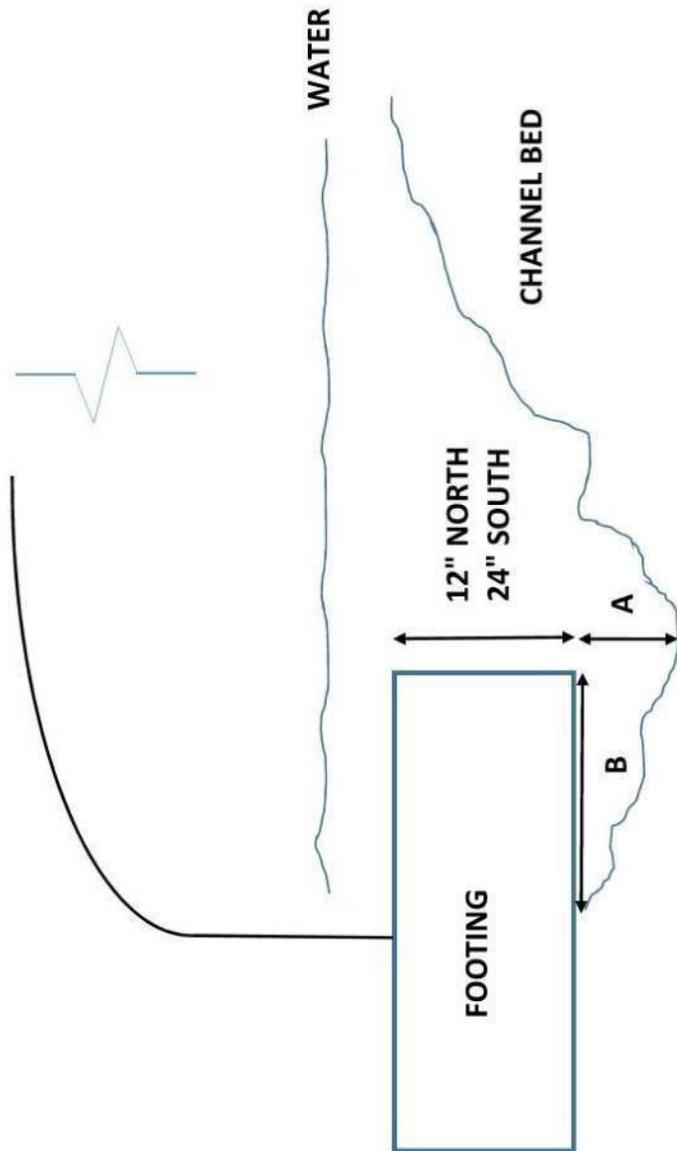
*MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/20/2016.

WEST ELEVATION

Sketch 3: West Elevation

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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CHARTS



Dimensions were measured in 2' increments from West fascia to East fascia for both footings.

	WEST	2'	4'	6'	8'	10'	12'	14'	16'	18'	20'	EAST
NORTH FOOTING A/B	21"/21"	24"/25"	24"/25"	15"/33"	26"/26"	22"/23"	26"/18"	1"/8"	-9"	-6"	-7"	-3"
SOUTH FOOTING A/B	-4"	-1"	-7"	-6"	-5.5"	-5"	-1"	-2"	0"	1"/0"	-5"	-1"

Positive Numbers (A) denote bottom of footing is exposed. B dimension measures depth of undermining.
 Negative Numbers (A) denote bottom of footing is not fully exposed.

Measurements taken in the field are approximate, +/- 1" accuracy due to difficult field access.
 Field measurements taken on 06/20/2016

Chart 1: Scour Table

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 1: Bridge Wearing Surface Transverse Cracking with Tire Wear



Photo 2: East Bridge Rail (Parapet)

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 3: West Bridge Rail (Parapet) with Northwest Top Concrete Section Spalled

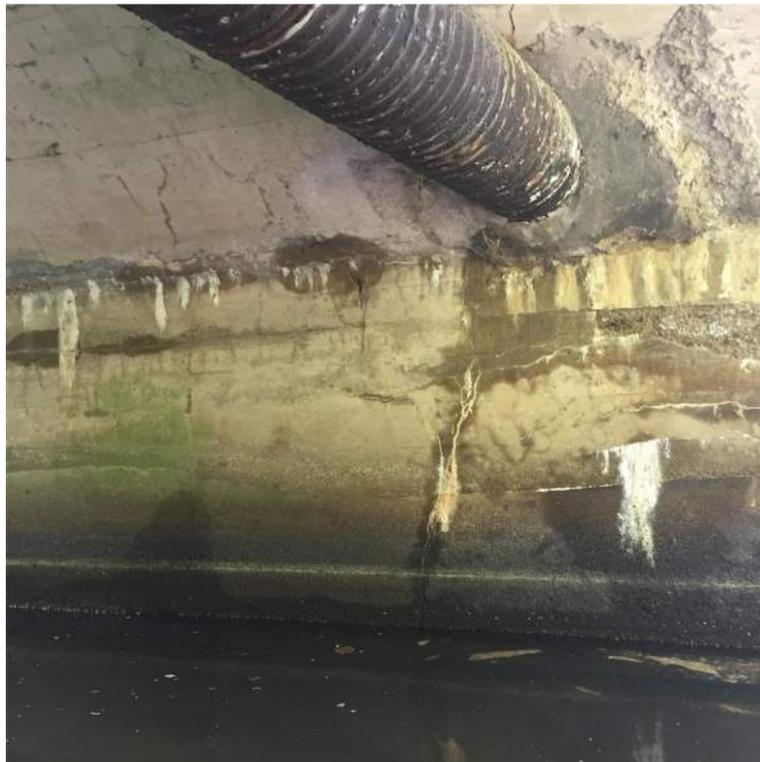


Photo 4: South Spring Line Utility Patch Spall with Crack

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 5: North Spring Line Utility Patch Spall with Crack Propagating into Arch



Photo 6: North Approach Pavement with Map Cracking

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 7: Northwest Arch/Arch Ring Crack Propagating from Utility Patch



Photo 8: West Arch Underside Crack from Utility Patch to Utility Patch with Cracks Propagating off Main Crack

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 9: Typical Utility Support Embedded in Arch with Spall



Photo 10: Southwest Spandrel Wall Spall Under Parapet Extending into Southwest Wingwall

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 11: South Spring Line near East Fascia Spring Line Spall with Active Leakage and Efflorescence



Photo 12: North Spring Line Near West Fascia Crack/Spall with Active Leakage

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 13: Southwest Breastwall Map Cracking with Efflorescence and Active Leakage



Photo 14: Northwest Breastwall Map Cracking

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 15: South Breastwall at West Fascia Spalled Concrete that Extends into Southwest Wingwall



Photo 16: Southwest Wingwall Spall

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 17: Northwest Wingwall Cracked/Broken Section

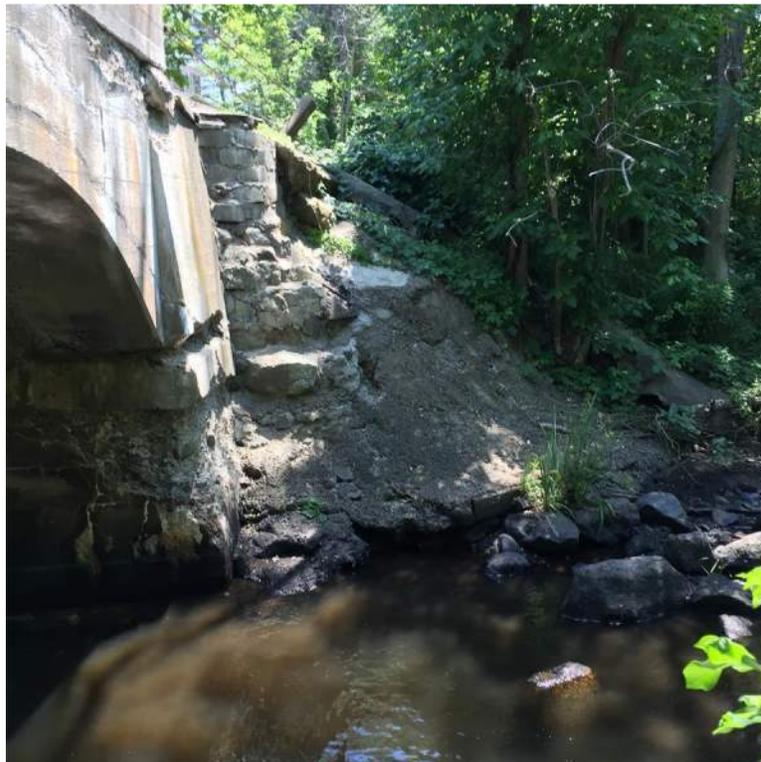


Photo 18: Southwest Embankment Slope Paving that is Cracked/Deteriorated

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 19: Northwest Transition Rail Does Not Connect to Bridge Rail (Parapet)



Photo 20: Northeast Transition Rail Does Not Connect with Bridge Rail (Parapet)

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 21: Southeast Transition Two Steel Wire Transition Rail



Photo 22: Southwest Approach Two Wire Cable Steel Rail and Concrete Posts Bent/Broken with up to 100% Loss of Section

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS



Photo 23: Southwest Approach Two Wire Cable Steel Guardrail Buried End



Photo 24: Southeast Wingwall

CITY/TOWN ROWLEY	B.I.N. 8BK	BR. DEPT. NO. R-11-002	8.-STRUCTURE NO. R11002-8BK-MUN-BRI	INSPECTION DATE JUN 20, 2016
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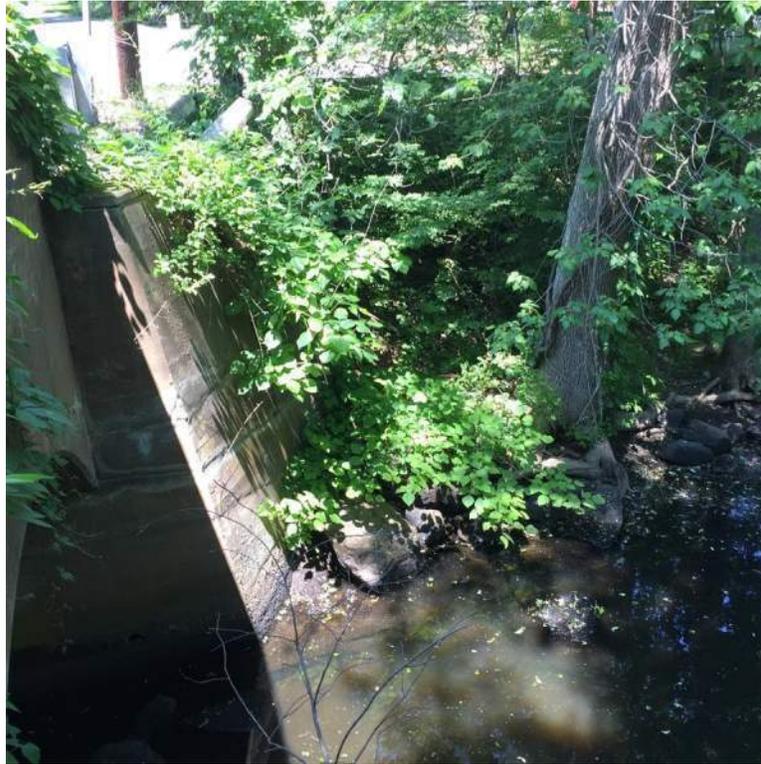
PHOTOS

Photo 25: Northeast Wingwall

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
B7X

ROUTINE ARCH INSPECTION

BR. DEPT. NO.
R-11-005

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11005-B7X-MUN-NBI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE SEP 13, 2017
07-FACILITY CARRIED HWY DODGE ROAD	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 2009	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 111 : Concrete Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER P. Burke	
107-DECK TYPE N : Not applicable	WEATHER Clear	TEMP. (air) 27°C	TEAM MEMBERS A. POWER	

ITEM 58 **N**

DECK DEF

1. Wearing surface	8	-
2. Deck Condition	N	-
3. Spandrel Fill	8	-
4. Curbs	8	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	8	-
9. Anti Missile Fence	N	-
10 Drainage System	8	-
11 Lighting Standards	N	-
12 Utilities	H	-
13 Deck Joints	N	-
14	N	-
15	N	-
16	N	-

CURB REVEAL (In millimeters)

N	S
175	175

ITEM 59 **7**

SUPERSTRUCTURE DEF

1. Arch/Arch Ring	7	M-P
2. Keystone Area	N	-
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	8	-
6. Spring Lines	8	-
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10 Masonry Joints	N	-
11 Rivets & Bolts	N	-
12 Welds	N	-
13 Deformation/Flattening	7	-
14 Member Alignment	7	-
15 Paint/Coating	N	-
16	N	-

Year Painted **N**

COLLISION DAMAGE: Please explain
None (X) Minor () Moderate () Severe ()

LOAD DEFLECTION: Please explain
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: Please explain
None (X) Minor () Moderate () Severe ()

ITEM 60 **7**

SUBSTRUCTURE DEF

1. Abutments	Dive	Cur	7	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	7		-
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	8		-
g. Pointing	N	N		-
h. Footings	N	H		-
i. Piles	N	N		-
j. Scour	N	N		-
k. Settlement	N	8		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			7	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	7		-
e. Pointing	N	N		-
f. Footing	N	H		-
g. Piles	N	N		-
h. Scour	N	8		-
i. Settlement	N	8		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

APPROACHES DEF

a. Appr. pavement condition	8	-
b. Appr. Roadway Settlement	8	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N) **N**

a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

Any Fracture Critical Member: (Y/N) **N**

Any Cracks: (Y/N) **N**

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE:
None (X) Minor () Moderate () Severe ()

I-60 (Dive Report): **N** I-60 (This Report): **7**

93B-U/W (DIVE) Insp **00/00/0000**

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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ITEM 61 8

CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	N	8	-
2.Embankment Erosion	N	8	-
3.Debris	N	8	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	N	-
7.Aggradation	N	7	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low () None ()

ITEM 61 (Dive Report): N ITEM 61 (This Report): 8

93b-U/W INSP. DATE:

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	1	8	-
B. Transitions	1	7	-
C. Approach Guardrail	1	7	M-P
D. Approach Guardrail Ends	1	7	-

WEIGHT POSTING Not Applicable X

H 3 3S2 Single
Actual Posting: N N N N
Recommended Posting: N N N N

Waived Date: EJDMT Date:

At bridge Other Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

	E W	E W	
	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	

CLEARANCE POSTING

Not X

	N S	N S	
	ft in	ft in	meter
Actual Field Measurement	<input type="text"/> 0	<input type="text"/> 0	
Posted Clearance	<input type="text"/> 0	<input type="text"/> 0	

At bridge Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

	N S	N S	
	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS 8

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): Y

Date:

Inspection data at time of existing rating
I 58: - I 59: 7 I 60: 8 Date :09/09/2011

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): N

If YES please give priority:
HIGH () MEDIUM () LOW ()

REASON: _____

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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REMARKS

According to design plans:

Approaches and abutments are East and West.

Elevations are South and North.

Two spans precast concrete reinforced archs, numbered from West to East.

Each arch has four sections numbering from South to North.

Mill River flows South to North.

TEM 59 - SUPERSTRUCTURE

tem 59.1 - Arch/Arch Ring

There is hairline cracking in all 4 sections of Spans 1 and 2 at the crown area. **(Photo 1)**

There is hairline cracking on the north face of Section 4 and south face of Section 1 in both spans at the crown. **(Photo 2)**

Span 1, Section 3: spall measuring: 8" Diameter x 1" deep located at the eastern half of arch, 4' from the crown area. **(Photo 3)**

tem 59.14 - Member Alignment

Section 3 in Span 1 is misaligned 3/4" lower than Section 4 at midspan. **(Photo 4)**

TEM 60 - SUBSTRUCTURE

tem 60.1 - Abutments

tem 60.1.d - Breastwalls

A few sporadic vertical hairline cracks were present in east and west breastwalls.

tem 60.2 - Piers or Bents

tem 60.2.d - Stems/Webs/Pierwalls

A few sporadic minor cracks were present on the east and west face of the pierwall.

TEM 61 - CHANNEL AND CHANNEL PROTECTION

tem 61.4 - Vegetation

Vegetation growing at upstream end effecting flow.

tem 61.7 - Aggradation

Minor aggradation in Span 1 restricting flow.

TRAFFIC SAFETY

tem 36a - Bridge Railing

Both sides - Type " T101 Modified Bridge Rail with type "ss" guardrail.

tem 36b - Transitions

Continuation of type "ss" guardrail.

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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REMARKS

Continuation of type "ss" guardrail.

Southwest approach guardrail- Minor scrapes and dents (**Photo 5**).

Northeast approach guardrail shows minor scrapes and dents near buried end treatment. (**Photo 6**)

Several spacer blocks are loose and misaligned. (**Photo 7**)

Item 36d - Approach Guardrail Ends

Northwest, southwest and southeast, have boxing glove ends.

Southwest end treatment has minor damage. (**Photo 8**)

The northeast has a buried end with minor scrapes and dents. (**Photo 6**).

Photo Log

- Photo 1 : Cracking at Span 1 Section 4 intrados. (Typical throughout both spans)
- Photo 2 : Cracking at north face of Span 1 Section 4 (typical)
- Photo 3 : Spall at Span 1 Section 3: 8" Diameter x 1" deep.
- Photo 4 : Span 1, Section 3/Section 4 interface: Section 3 is 3/4" lower than Section 4 at crown.
- Photo 5 : Southwest approach guardrail minor scrapes and dents.
- Photo 6 : Northeast guardrail has minor scrapes and dents near buried end treatment.
- Photo 7 : Northwest guardrail end with loose misaligned spacer block.
- Photo 8 : Southwest boxing glove end treatment has minor damage.

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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PHOTOS

Photo 1: Cracking at Span 1 Section 4 intrados. (Typical throughout both spans)



Photo 2: Cracking at north face of Span 1 Section 4 (typical)

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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PHOTOS

Photo 3: Spall at Span 1 Section 3: 8" Diameter x 1" deep.



Photo 4: Span 1, Section 3/Section 4 interface: Section 3 is 3/4" lower than Section 4 at crown.

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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PHOTOS

Photo 5: Southwest approach guardrail minor scrapes and dents.



Photo 6: Northeast guardrail has minor scrapes and dents near buried end treatment.

CITY/TOWN ROWLEY	B.I.N. B7X	BR. DEPT. NO. R-11-005	8.-STRUCTURE NO. R11005-B7X-MUN-NBI	INSPECTION DATE SEP 13, 2017
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PHOTOS

Photo 7: Northwest guardrail end with loose misaligned spacer block.



Photo 8: Southwest boxing glove end treatment has minor damage.

National Bridge Element Inspection

BDEPT# **R-11-005**

Date **09/13/2017**

B.I.N. **B7X**

District Bridge Inspection Eng'r **Thomas G. Weil**

Item 8 **R11005-B7X-MUN-NBI**

Inspecting Agency **Mass. Highway Dept.**

Span Group **1**

Team Leader **Patrick Burke**

Town **Rowley**

Team **Adam Power**

District **4**

Member(s)

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
144	Re Conc Arch	feet	2	49.000	<input type="checkbox"/> %	47.000	2.000		
Notes :									
> 1080	<i>Delamination/Spall/Patched Area</i>	feet	2	1.000	<input type="checkbox"/> %		1.000		
Notes :									
> 1120	<i>Efflorescence/Rust Staining</i>	feet	2	1.000	<input type="checkbox"/> %		1.000		
Notes :									
> 1130	<i>Cracking (RC and Other)</i>	feet	2	10.000	<input type="checkbox"/> %	10.000			
Notes :									
210	Re Conc Pier Wall	feet	2	28.000	<input type="checkbox"/> %	28.000			
Notes :									
> 1130	<i>Cracking (RC and Other)</i>	feet	2	5.000	<input type="checkbox"/> %	5.000			
Notes :									
215	Re Conc Abutment	feet	2	56.000	<input type="checkbox"/> %	56.000			
Notes :									
> 1130	<i>Cracking (RC and Other)</i>	feet	2	5.000	<input type="checkbox"/> %	5.000			
Notes :									
330	Metal Bridge Railing	feet	2	102.000	<input type="checkbox"/> %	102.000			
Notes :									

STRUCTURES INSPECTION FIELD REPORT

INITIAL ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST
04

B.I.N.
8BL

BR. DEPT. NO.
R-11-006

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11006-8BL-MUN-BRI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUN 9, 2016
07-FACILITY CARRIED HWY MILL RD	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1850	106-YR REBUILT 1900	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 302 : Steel Stringer/Girder	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER M. Scott	PROJ MGR STV Incorporated
107-DECK TYPE 1 : Concrete Cast-in-Place	WEATHER Overcast	TEMP. (air) 17°C	TEAM MEMBERS J. MACKENZIE	

ITEM 58 5

DECK DEF

1. Wearing surface	5	M-P
2. Deck Condition	5	M-P
3. Stay in place forms	N	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	2	S-A
9. Anti Missile Fence	N	-
10. Drainage System	N	-
11. Lighting Standards	N	-
12. Utilities	N	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)

E	W
N	N

ITEM 59 4

SUPERSTRUCTURE DEF

1. Stringers	N	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Girders or Beams	4	S-P
5. Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6. Pin & Hangers	N	-
7. Conn Plt's, Gussets & Angles	N	-
8. Cover Plates	N	-
9. Bearing Devices	H	-
10. Diaphragms/Cross Frames	N	-
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Member Alignment	6	-
14. Paint/Coating	N	-
15.	N	-

Year Painted N

COLLISION DAMAGE: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD DEFLECTION: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: *Please explain*
None (X) Minor () Moderate () Severe ()

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 6

SUBSTRUCTURE DEF

1. Abutments	Dive	Cur	6	
a. Pedestals	N	N		-
b. Bridge Seats	N	5		M-P
c. Backwalls	N	H		-
d. Breastwalls	N	6		M-P
e. Wingwalls	N	5		M-P
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	N	N		-
i. Piles	N	N		-
j. Scour	N	N		-
k. Settlement	N	N		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE:
None (X) Minor () Moderate () Severe ()

SCOUR: Please explain
None (X) Minor () Moderate () Severe ()

I-60 (Dive Report): N I-60 (This Report): 6

93B-U/W (DIVE) Insp 00/00/0000

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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ITEM 61				6
CHANNEL & CHANNEL PROTECTION				
	Dive	Cur	DEF	
1.Channel Scour	N	N	-	
2.Embankment Erosion	N	6	-	
3.Debris	N	N	-	
4.Vegetation	N	6	-	
5.Utilities	N	N	-	
6.Rip-Rap/Slope Protection	N	6	-	
7.Aggradation	N	N	-	
8.Fender System	N	N	-	
STREAM FLOW VELOCITY: Tidal () High () Moderate () Low (<input checked="" type="checkbox"/>) None ()				
ITEM 61 (Dive Report): <input type="checkbox"/> N ITEM 61 (This Report): <input type="checkbox"/> 6				
93b-U/W INSP. DATE: <input type="text" value="00/00/0000"/>				

ITEM 36 TRAFFIC SAFETY				
	36	COND	DEF	
A. Bridge Railing	0	2	S-A	
B. Transitions	0	N	-	
C. Approach Guardrail	0	N	-	
D. Approach Guardrail Ends	0	N	-	
WEIGHT POSTING <i>Not Applicable</i> <input checked="" type="checkbox"/> X				
	H	3	3S2	Single
Actual Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Recommended Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Waived Date: <input type="text" value="00/00/0000"/> EJDMT Date: <input type="text" value="00/00/0000"/>				
	At bridge		Other Advance	
Signs In Place	N	S	N	S
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CLEARANCE POSTING				
	E		W	
Actual Field Measurement	ft	in	ft	in
Posted Clearance	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	At bridge		Advance	
Signs In Place	E	W	E	W
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ACCESSIBILITY (Y/N/P)		
	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N
TOTAL HOURS <input type="text" value="8"/>		
PLANS (Y/N): <input type="checkbox"/> N		
(V.C.R.) (Y/N): <input type="checkbox"/> N		
TAPE#: _____		
List of field tests performed:		

RATING
Rating Report (Y/N): <input type="checkbox"/> N
Date: <input type="text" value="00/00/0000"/>
Inspection data at time of existing rating
I 58: - I 59: - I 60: - Date :00/00/0000

(To be filled out by DBIE)		If YES please give priority:	
Request for Rating or Rerating (Y/N):	<input type="checkbox"/> Y	HIGH () MEDIUM (<input checked="" type="checkbox"/>) LOW ()	
REASON: <u>Never rated</u>			

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
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STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
8BL

INITIAL ROUTINE & SPECIAL MEMBER INSPECTION

BR. DEPT. NO.
R-11-006

CITY/TOWN ROWLEY	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	11-Kilo. POINT 000.000	90-ROUTINE INSP. DATE Jun 9, 2016	93*-SPEC. MEMB. INSP. DATE Jun 9, 2016
07-FACILITY CARRIED HWY MILL RD	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1850	106-YR REBUILT 1900	*YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 302 : Steel Stringer/Girder	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER M. Scott	PROJ MGR STV Incorporated
107-DECK TYPE 1 : Concrete Cast-in-Place	WEATHER Overcast	TEMP. (air) 17°C	TEAM MEMBERS J. MACKENZIE	

WEIGHT POSTING	<i>Not Applicable</i> <input checked="" type="checkbox"/>	At bridge	Advance	PLANS (Y/N): <input type="checkbox"/> N
Actual Posting	H <input type="checkbox"/> N 3 <input type="checkbox"/> N 3S2 <input type="checkbox"/> N Single <input type="checkbox"/> N	N <input type="checkbox"/> S <input type="checkbox"/>	N <input type="checkbox"/> S <input type="checkbox"/>	(V.C.R.) (Y/N): <input type="checkbox"/> N
Recommended Posting	H <input type="checkbox"/> N 3 <input type="checkbox"/> N 3S2 <input type="checkbox"/> N Single <input type="checkbox"/> N	<input type="checkbox"/>	<input type="checkbox"/>	TAPE#: _____
Waived Date: <input type="text"/> 00/00/0000	EJDMT Date: <input type="text"/> 00/00/0000	Signs In Place (Y=Yes, N=No, NR=Not Required) Legibility/Visibility		

RATING	Rating Report (Y/N): <input type="checkbox"/> N Date: <input type="text"/> ----	Request for Rating or Rerating (Y/N): <input type="checkbox"/> Y	If YES please give priority: HIGH () MEDIUM (<input checked="" type="checkbox"/> X) LOW ()
Inspection data at time of existing rating I 58: - I 59: - I 60: - I 62: - Date : <input type="text"/> 00/00/0000		REASON: <u>Never rated</u>	

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS	PRESENT	H-20	3	3S2	
					(0-9)	(0-9)				
A	Item 59.4 - Girders or Beams	N		See remarks in comments section.		4				S-P
B										
C										
D										
E										

List of field tests performed:		I-58	I-59	I-60	I-62
	(Overall Previous Condition)	<input type="text"/> -	<input type="text"/> -	<input type="text"/> -	<input type="text"/> -
	(Overall Current Condition)	<input type="text"/> 5	<input type="text"/> 4	<input type="text"/> 6	<input type="text"/> -

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X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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REMARKS

The steel rail stringers are numbered from West fascia to East fascia. The rail at the West fascia is labeled R-1 and are numbered across the width of the bridge to the East fascia which is labeled R-20. (See sketches #1 & #3) The approaches are North and South. The elevations are East and West. The Mill River flows from West to East.

GENERAL REMARKS

The structure is a single span stringer bridge with closely spaced 4" to 5" steel rails functioning as the support beams. (See sketches #1 & #3, and chart #1) The steel rails clear spacing varies 6" +/- 1/2" with bricks located between the rails that rest on the top of the bottom flange. The top portion of the steel rails are concrete incased with what appears to be an unreinforced concrete deck. (See sketch #2 & #4) The superstructure sets on unreinforced concrete bridge seats that was poured on top of masonry stone abutments. (See sketch #5)

ITEM 58 - DECK

Item 58.1 - Wearing surface

The bituminous wearing surface on the bridge has tire wear with minimal crown. (See photo #1)

Item 58.2 - Deck Condition

The deck is an unreinforced 12" slab that partially encases the top 1/3 of steel rails. The East fascia is heavily spalled for up to the full length x full height x 3" depth. (See photo #2) The outside face of steel rail R-20 is exposed near midspan and backfill at the cold joint between the bridge rail concrete base and the fascia is seeping out. (See photo #3)

The deck underside at the East end between R-19 and R-20 near midspan is spalled up to 15" long x 8" wide x 4" deep with signs of active leakage through the deck onto R-19. (See photo #4)

The deck underside between rails is supported by bricks and there are random areas of missing/deteriorate/damaged bricks.

The West fascia cold joint between fascia and bridge rail concrete base is cracked with some random areas of efflorescence and minor rust staining. The West fascia has a spall up to 2" wide x 7" high x 2.75" deep. See photo #5)

Item 58.8 - Railing

See Item 36.a

APPROACHES

Approaches a - Appr. pavement condition

The bituminous wearing surface at the South approach has tire wear with minimal crown. (See photo #7)

Approaches b - Appr. Roadway Settlement

The North approach is gravel starting approximately 30' beyond the bridge, and has potholes and tire settlement at the joint between the bridge pavement and the approach gravel. (See photo #6)

The South approach is paved and has a depression in the Southeast side of road approximately 10 feet from bridge. (See photo #7)

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REMARKS

Item 59.4 - Girders or Beams

The rails are numbered from the West fascia R-1 to the East fascia R-20. (See sketches #1 & #3) The rail sizes vary from 4" wide to 5" wide. (See chart #1)

The rail ends at the North and South abutments typically have heavy deterioration to the bottom flanges up to +/-50% loss of section.

There are bricks that span between the rails preventing access to the top of the bottom rail, webs and top flange. Visual assessment was used to determine section loss due to inability to accurately measure the losses to the section.

Rail R-1 at the bottom flange has heavy rust across the full span with up to 25% loss of bottom flange section. (See photo #8)

Rail R-2 at the bottom flange has heavy deterioration across the full span with up to 50% loss of bottom flange section. (See photo #9)

Rail R-3 at the bottom flange has surface rust across the full span with up to 10% loss of bottom flange section.

Rail R-4 at the bottom flange has surface rust across the full span with up to 10% loss of bottom flange section.

Rail R-5 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section. (See photo #10)

Rail R-6 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section. Near the North abutment the bottom flange has a notch up to 12" long x 1.5" wide x full flange depth. (See photo #11)

Rail R-7 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section.

Rail R-8 at the bottom flange has surface rust across the full span with up to 10% loss of bottom flange section.

Rail R-9 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section. Near the South abutment the rail is spliced with a splice plate. (See photo #12)

Rails R-10 at the bottom flange has heavy deterioration across the full span with up to 50% loss of bottom flange section. Near the midspan there is loss of section to bottom flange up to 8" long x 1.75" wide x full flange depth. (See photos #13-14)

R-11 at the bottom flange has heavy deterioration across the full span with up to 50% loss of bottom flange section. (See photo #15)

R-12 at the bottom flange has heavy deterioration across the full span with up to 35% loss of bottom flange

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REMARKS

Rail R-13 at the bottom flange has surface rust across the full span with up to 10% loss of bottom flange section. Near the South abutment the rail is spliced with a splice plate.

Rail R-14 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section.

Rail R-15 at the bottom flange has surface rust across the full span with up to 20% loss of bottom flange section.

Rail R-16 at the bottom flange has heavy rust across the full span with up to 25% loss of bottom flange section. (See photo #18)

Rails R-17, R-18, R-19, and R-20 at the bottom flange has heavy rust across the full span with up to 50% loss of bottom flange section. (See photo #19-22)

Item 59.13 - Member Alignment

The abutments are slightly skewed and the span narrows from the West end (upstream) to the East end downstream).

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.b - Bridge Seats

The North and South bridge seats appear to be unreinforced concrete that are 8" high x 18" deep.

Bridge seats are generally hidden from view, but there are several full height cracks in the front face of the concrete cap below the bridge seat that clearly extend into the bridge seat. These cracks are defined below.

The South bridge seat has a crack under R-15 that starts at the bridge seat and extends down the concrete cap of the breastwall up to 7/16" wide x full height x full depth. (See photo #23) There is also a crack under R-19 that is up to 1/4" wide x full height x full depth. (See photo #24)

The North bridge seat has a crack under R-8 that starts at the bridge seat and extends down the concrete cap of the breastwall up to 1/2" wide x full height x full depth. (See photo #25) There is also a crack under R-3 that is up to 1/2" wide x full height x full depth. (See photo #26)

Item 60.1.d - Breastwalls

The South breastwall has a crack under R-15 that starts at the bridge seat and extends down the concrete cap of the breastwall up to 7/16" wide x full height x full depth. (See photo #23) There is also a crack under R-19 that is up to 1/4" wide x full height x full depth. (See photo #24) The South abutment below rail R-15 the crack in the breastwall has propagated down into the masonry stone abutment and has cracked up to 6" from bottom of the concrete cap with one stone cracked full depth. (See photo #23)

The North breastwall has a crack under R-8 that starts at the bridge seat and extends down the concrete cap of the breastwall up to 1/2" wide x full height x full depth. (See photo #25) There is also a crack under R-3 that is up to 1/2" wide x full height x full depth. (See photo #26)

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REMARKS

The Northeast and Southwest wingwalls are dry laid stones and appear to have some stones that have been dislodged and fallen into the stream. (See photo #27)

The Northwest and Southwest wingwalls are masonry and appear to be in fair condition.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.2 - Embankment Erosion

The embankments at the wingwall ends generally have minor erosion.

Item 61.4 - Vegetation

The embankments have heavy vegetation growth.

Item 61.6 - Rip-Rap/Slope Protection

There is minimal riprap protection at the ends of the wingwalls.

TRAFFIC SAFETY

Item 36a - Bridge Railing

The bridge railing system is 6"x6" concrete posts with a 2"x12" timber rail spanning the posts.

The Southeast bridge rail post concrete base has broken off and is overhanging the Southeast fascia. (See photos #28 & #29)

The North bridge rail spans completely over the bridge without any posts on the bridge (approximately +/- 3'-8" between posts). With push of the hand, rail easily deflects a foot or more. Rail has almost no capacity to redirect an errant vehicle. (See photo #30)

Sketch / Chart / Photo Log

- Sketch 1 : Framing Plan
- Sketch 2 : Deck View
- Sketch 3 : Cross Section Looking South
- Sketch 4 : Section A-A
- Sketch 5 : West Elevation
- Chart 1 : Steel Rail Stringer Sizing and Losses
- Photo 1 : Typical Bridge Wearing Surface Tire Wear
- Photo 2 : East Fascia Heavy Spalling
- Photo 3 : East Fascia Spalling with Exposed Outside Face of Rail R-20
- Photo 4 : East Fascia Deck Underside Between Rails R-19 and R-20 Spall
- Photo 5 : West Fascia Cold Joint Crack with Efflorescence and Rust Staining
- Photo 6 : North Approach (Looking North) at End of Bridge Pavement Gravel Potholes
- Photo 7 : South Approach Pavement Settlement (Looking South) at Southeast Side of Road
- Photo 8 : West Fascia Rail R-1 Bottom Flange Typical Span Heavy Rusting
- Photo 9 : Rail R-2 Bottom Flange Typical Span Heavy Deterioration
- Photo 10 : Rail R-5 Bottom Flange Typical Span Surface Rusting
- Photo 11 : Rail R-6 Bottom Flange Typical Span Surface Rusting and Notched Area
- Photo 12 : Rail R-9 Bottom Flange Splice and Splice Plate
- Photo 13 : Rail R-10 Bottom Flange Typical Span Heavy Deterioration

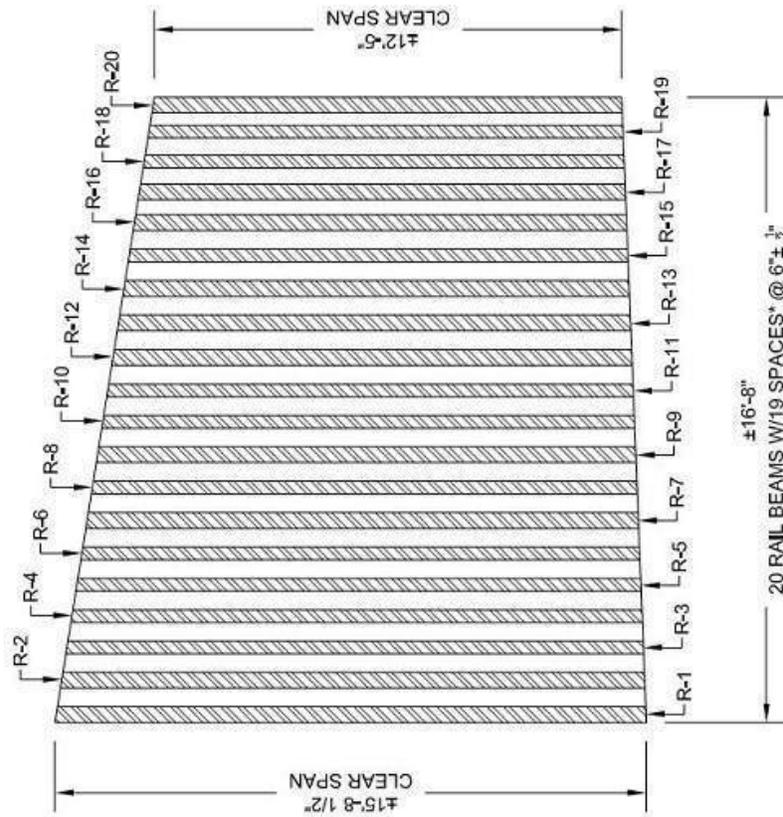
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REMARKS

- ~~REMARKS~~
- Photo 18 : Rail R-16 Bottom Flange Typical Span Surface Rusting
 - Photo 19 : Rail R-17 Bottom Flange Typical Span Heavy Deterioration
 - Photo 20 : Rail R-18 Bottom Flange Typical Span Heavy Deterioration
 - Photo 21 : Rail R-19 Bottom Flange Typical Span Heavy Deterioration with Active Leakage
 - Photo 22 : Rail R-20 Bottom Flange Typical Span Heavy Deterioration
 - Photo 23 : South Abutment Cracked Stone Below Rail R-15
 - Photo 24 : South Abutment Concrete Bridge Seat Full Depth Crack Under Rail R-19
 - Photo 25 : North Abutment Concrete Bridge Seat Crack Below Rail R-8
 - Photo 26 : North Abutment Concrete Bridge Seat Crack Below Rail R-13
 - Photo 27 : Northeast Wingwall Dislodged Stones
 - Photo 28 : Southeast Bridge Rail Concrete Post Base Separation
 - Photo 29 : Southeast Bridge Rail Post Overhanging the East Fascia
 - Photo 30 : West Bridge Rail Span Over Bridge Without Posts on Bridge

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SKETCHES



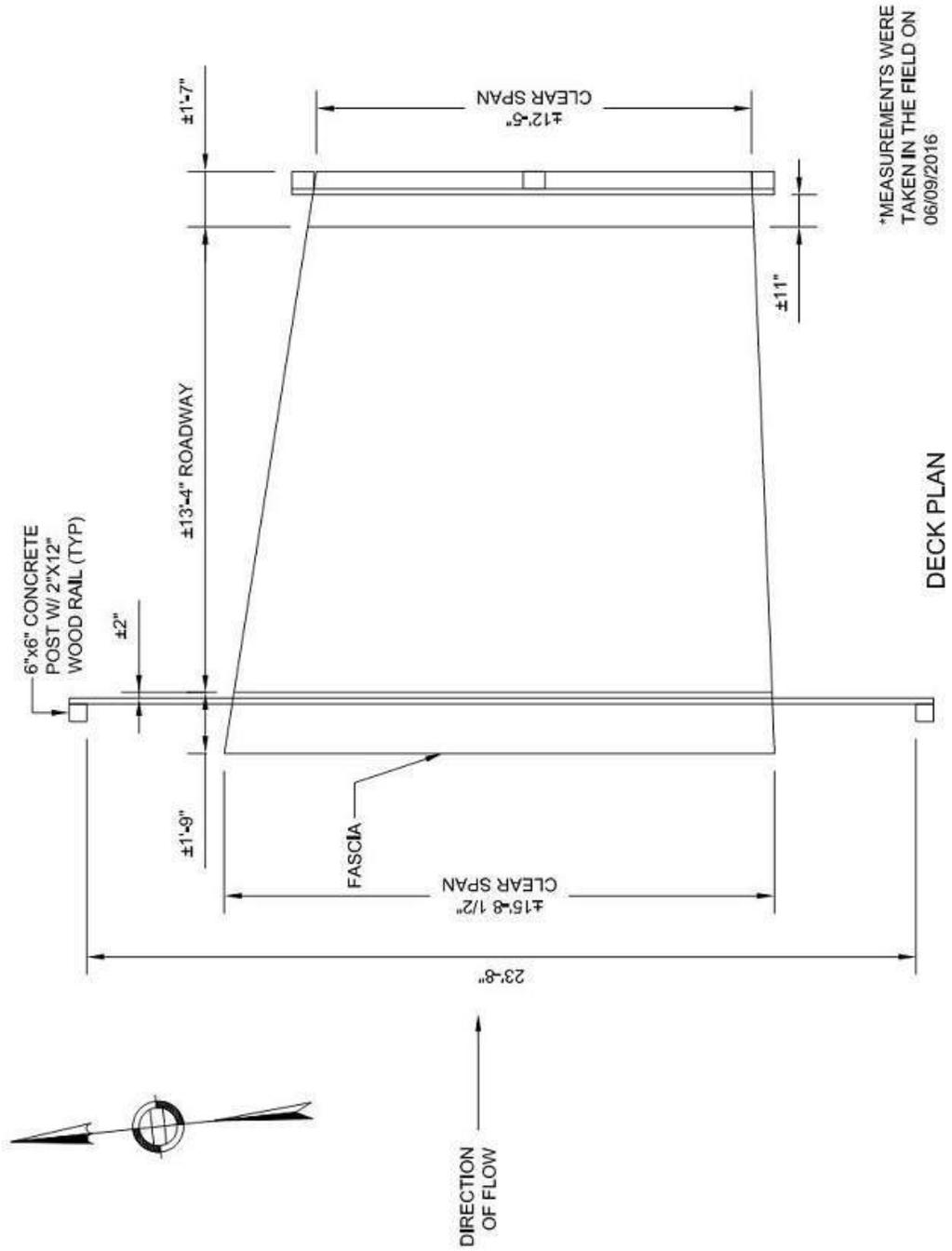
*CLEAR SPACE BETWEEN BOTTOM FLANGES.
*MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/09/2016

FRAMING PLAN

Sketch 1: Framing Plan

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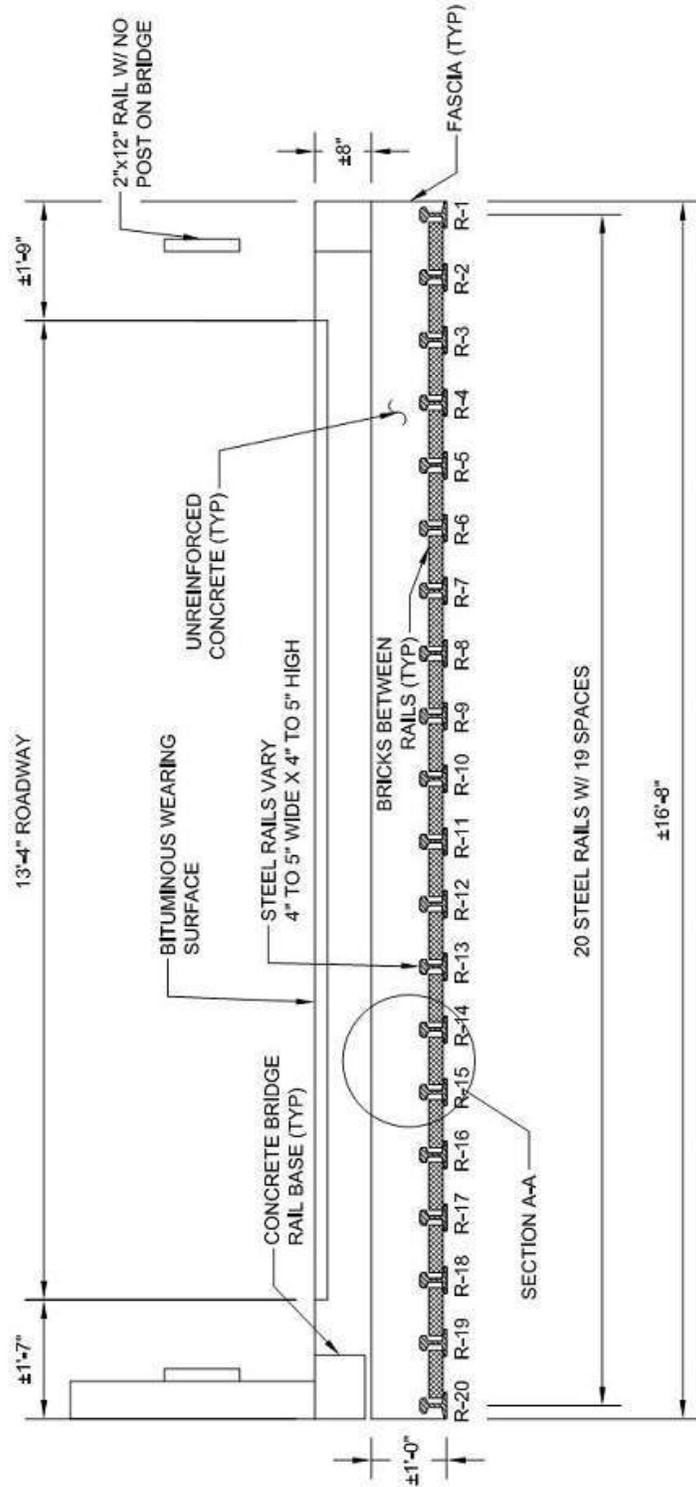
SKETCHES



Sketch 2: Deck View

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SKETCHES



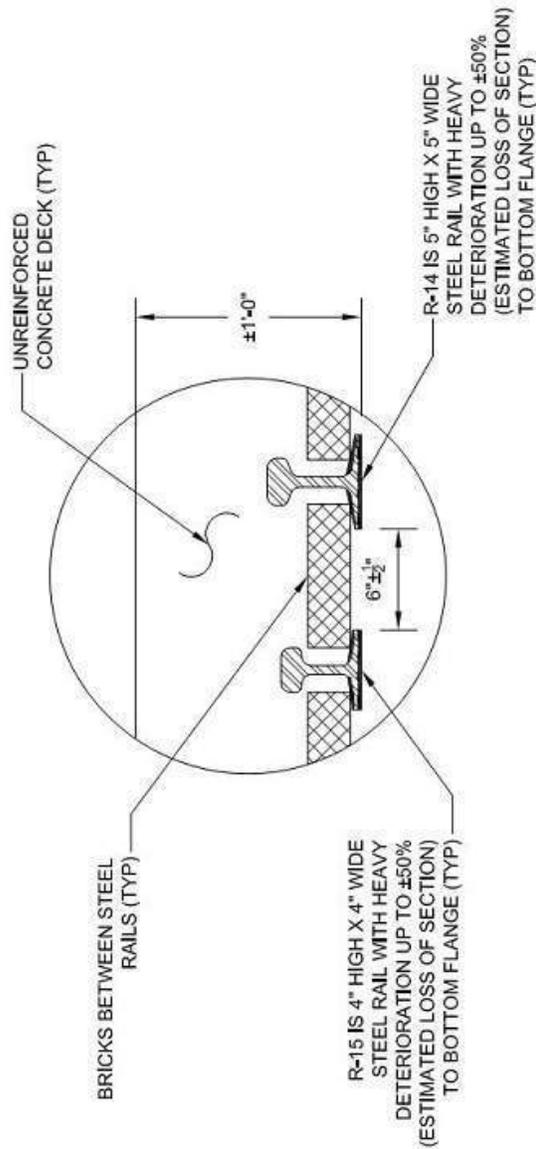
*MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/09/2016

CROSS SECTION LOOKING SOUTH

Sketch 3: Cross Section Looking South

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SKETCHES



WIDESPREAD HEAVY DETEIORATION WAS OBSERVED AT THE BOTTOM OF RAIL. THE BRICKS BETWEEN RAILS PREVENTED ACCESS TO THE TOP OF THE BOTTOM FLANGE, WEBS AND TOP OF RAILS. LOSSES TO THE BOTTOM FLANGE WAS NOT FIELD MEASURED, BUT WAS BASED ON A VISUAL ASSESSMENT DUE TO THE INABILITY TO ACCURATELY MEASURE THE LOSSES.

*MEASUREMENTS WERE TAKEN IN THE FIELD ON 06/09/2016

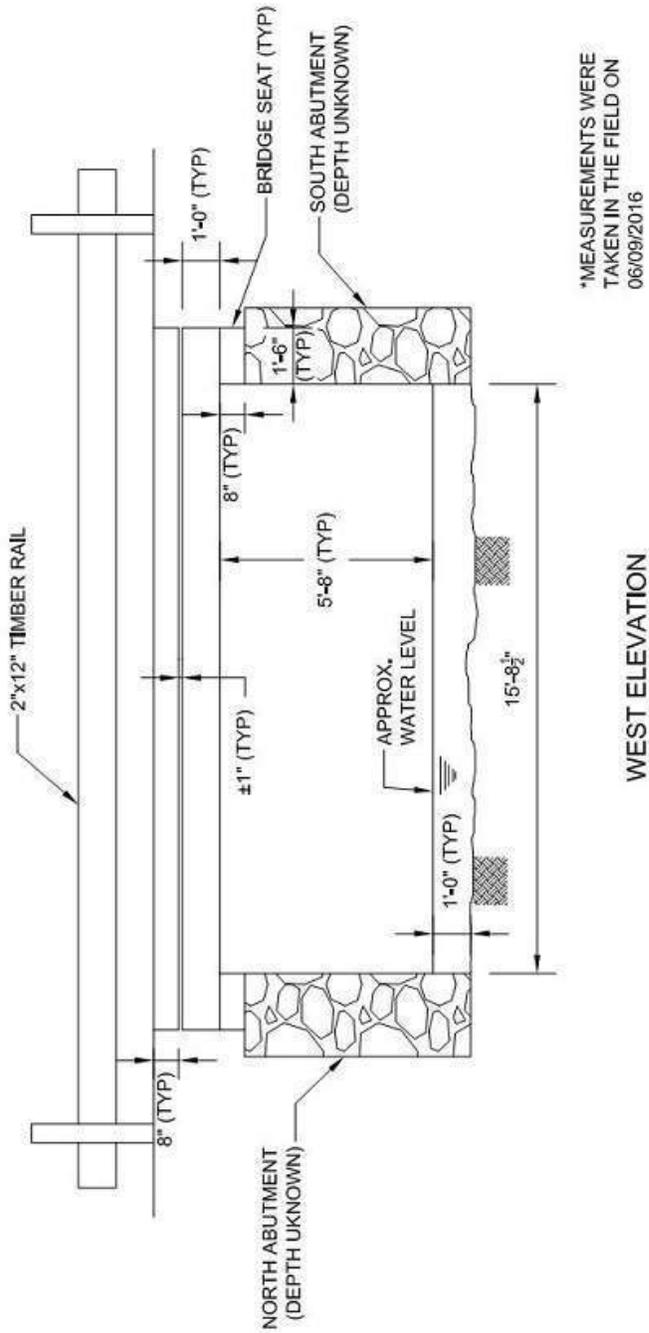
SECTION A-A

SEE SKETCH #3 FOR LOCATION

Sketch 4: Section A-A

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SKETCHES



Sketch 5: West Elevation

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CHARTS

VISUAL ESTIMATED PERCENT SECTION LOSS OF RAIL BOTTOM FLANGES ALONG FULL LENGTH OF BEAM/RAIL

Rail #	Width (in)	% Losses
R-1	5.00	± 25
R-2	5.00	± 50
R-3	4.00	± 10
R-4	4.00	± 10
R-5	4.25	± 20
R-6	4.00	± 20
R-7	5.00	± 20
R-8	4.00	± 10
R-9	5.00	± 20
R-10	4.00	± 50
R-11	4.00	± 50
R-12	5.00	± 35
R-13	5.00	± 10
R-14	5.00	± 20
R-15	4.00	± 20
R-16	5.00	± 25
R-17	5.00	± 50
R-18	4.00	± 50
R-19	4.00	± 50
R-20	5.00	± 50

RAIL ENDS AT ABUTMENTS TYPICALLY VISUALLY HAVE ± 50% LOSS OF SECTION

Chart 1: Steel Rail Stringer Sizing and Losses

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PHOTOS

Photo 1: Typical Bridge Wearing Surface Tire Wear



Photo 2: East Fascia Heavy Spalling

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PHOTOS

Photo 3: East Fascia Spalling with Exposed Outside Face of Rail R-20



Photo 4: East Fascia Deck Underside Between Rails R-19 and R-20 Spall

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PHOTOS

Photo 5: West Fascia Cold Joint Crack with Efflorescence and Rust Staining



Photo 6: North Approach (Looking North) at End of Bridge Pavement Gravel Potholes

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 7: South Approach Pavement Settlement (Looking South) at Southeast Side of Road



Photo 8: West Fascia Rail R-1 Bottom Flange Typical Span Heavy Rusting

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 9: Rail R-2 Bottom Flange Typical Span Heavy Deterioration



Photo 10: Rail R-5 Bottom Flange Typical Span Surface Rusting

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PHOTOS

Photo 11: Rail R-6 Bottom Flange Typical Span Surface Rusting and Notched Area



Photo 12: Rail R-9 Bottom Flange Splice and Splice Plate

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 13: Rail R-10 Bottom Flange Typical Span Heavy Deterioration



Photo 14: Rail R-10 at Midspan Bottom Flange Partial Loss of Section

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PHOTOS

Photo 15: Rail R-11 Bottom Flange Typical Span Heavy Deterioration



Photo 16: Rail R-12 Bottom Flange Typical Span Heavy Deterioration

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PHOTOS

Photo 17: Rail R-12 at North End Bottom Flange Splice and Heavy Deteriorated Splice Plate



Photo 18: Rail R-16 Bottom Flange Typical Span Surface Rusting

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PHOTOS

Photo 19: Rail R-17 Bottom Flange Typical Span Heavy Deterioration



Photo 20: Rail R-18 Bottom Flange Typical Span Heavy Deterioration

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PHOTOS

Photo 21: Rail R-19 Bottom Flange Typical Span Heavy Deterioration with Active Leakage



Photo 22: Rail R-20 Bottom Flange Typical Span Heavy Deterioration

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 23: South Abutment Cracked Stone Below Rail R-15



Photo 24: South Abutment Concrete Bridge Seat Full Depth Crack Under Rail R-19

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PHOTOS

Photo 25: North Abutment Concrete Bridge Seat Crack Below Rail R-8



Photo 26: North Abutment Concrete Bridge Seat Crack Below Rail R-13

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 27: Northeast Wingwall Dislodged Stones



Photo 28: Southeast Bridge Rail Concrete Post Base Separation

CITY/TOWN ROWLEY	B.I.N. 8BL	BR. DEPT. NO. R-11-006	8.-STRUCTURE NO. R11006-8BL-MUN-BRI	INSPECTION DATE JUN 9, 2016
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PHOTOS

Photo 29: Southeast Bridge Rail Post Overhanging the East Fascia



Photo 30: West Bridge Rail Span Over Bridge Without Posts on Bridge

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
8BM

INITIAL ROUTINE ARCH INSPECTION

BR. DEPT. NO.
R-11-007

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11007-8BM-MUN-BRI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUN 20, 2016
07-FACILITY CARRIED HWY GLEN ST EXT	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1850	106-YR REBUILT 1900	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Rural Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 811 : Masonry Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER M. Scott	PROJ MGR STV Incorporated
107-DECK TYPE N : Not applicable	WEATHER Sunny	TEMP. (air) 27°C	TEAM MEMBERS J. MACKENZIE , A. GOUVEIA	

ITEM 58 **N**

DECK DEF

1. Wearing surface	7	-
2. Deck Condition	N	-
3. Spandrel Fill	H	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	6	-
9. Anti Missile Fence	N	-
10 Drainage System	N	-
11 Lighting Standards	N	-
12 Utilities	N	-
13 Deck Joints	N	-
14	N	-
15	N	-
16	N	-

CURB REVEAL (In millimeters)

N	S
N	N

ITEM 59 **7**

SUPERSTRUCTURE DEF

1. Arch/Arch Ring	7	-
2. Keystone Area	7	-
3. Stringers	N	-
4. Floorbeams	N	-
5. Spandrel Walls	7	-
6. Spring Lines	7	-
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Pin & Hangers	N	-
10 Masonry Joints	N	-
11 Rivets & Bolts	N	-
12 Welds	N	-
13 Deformation/Flattening	N	-
14 Member Alignment	7	-
15 Paint/Coating	N	-
16	N	-

Year Painted **N**

COLLISION DAMAGE: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD DEFLECTION: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: *Please explain*
None (X) Minor () Moderate () Severe ()

ITEM 60 **7**

SUBSTRUCTURE DEF

1. Abutments	Dive	Cur	7	DEF
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	7		-
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	N	X		-
i. Piles	N	N		-
j. Scour	N	H		-
k. Settlement	N	7		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	DEF
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	DEF
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

APPROACHES DEF

a. Appr. pavement condition	7	-
b. Appr. Roadway Settlement	8	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N) **N**

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

Any Fracture Critical Member: (Y/N) **N**

Any Cracks: (Y/N) **N**

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE:
None (X) Minor () Moderate () Severe ()

I-60 (Dive Report): **N** I-60 (This Report): **7**

93B-U/W (DIVE) Insp **00/00/0000**

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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ITEM 61 7

CHANNEL & CHANNEL PROTECTION

	Dive	Cur	DEF
1.Channel Scour	N	H	-
2.Embankment Erosion	N	7	-
3.Debris	N	N	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	N	-
7.Aggradation	N	N	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal () High () Moderate () Low (X) None ()

ITEM 61 (Dive Report): N ITEM 61 (This Report): 7

93b-U/W INSP. DATE:

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	6	-
B. Transitions	0	0	S-P
C. Approach Guardrail	0	0	S-P
D. Approach Guardrail Ends	0	0	S-P

WEIGHT POSTING Not Applicable X

H 3 3S2 Single
Actual Posting: N N N N
Recommended Posting: N N N N

Waived Date: EJDMT Date:

At bridge Other Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

E	W	E	W
[]	[]	[]	[]

CLEARANCE POSTING

Not X

ft	in	ft	in	
[]	0	[]	0	meter
[]	0	[]	0	

At bridge Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)
Legibility/Visibility

N	S	N	S
[]	[]	[]	[]

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS 6

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): N

Date:

Inspection data at time of existing rating
I 58: - I 59: - I 60: - Date :00/00/0000

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): N

If YES please give priority:
HIGH () MEDIUM () LOW ()

REASON: _____

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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REMARKS

The approaches are East and West. The elevations are North and South. The Mill River flows from South to North.

GENERAL REMARKS

The structure is a dry laid masonry arch bridge. It is no longer used for public access to Route 1. The East approach has guardrail blocking traffic from accessing the drive off of Route 1. The West approach is a drive that extends off Glen Street and terminates at end of East approach.

TEM 58 - DECK

tem 58.8 - Railing

See Item 36a.

TEM 59 - SUPERSTRUCTURE

tem 59.1 - Arch/Arch Ring

The arch ring underside has random areas of efflorescence leaking through stone voids. Arch stones are generally in good condition. (See Photos #1).

Both the East and West arch ring have a few small filler stones that have slightly shifted. (See Photos #2-3)

TEM 60 - SUBSTRUCTURE

tem 60.1 - Abutments

tem 60.1.d - Breastwalls

The breastwall is composed of large, dry laid masonry blocks that support the arch ring. The stones in the breastwall are generally in good condition.

tem 60.1.e - Wingwalls

Wingwalls are dry laid masonry stone and are generally in good condition. (See photo #4)

TRAFFIC SAFETY

tem 36a - Bridge Railing

There is evidence of one original bridge rail post in the Southwest roadway. Currently masonry brick posts have been set on a +/- 2" concrete spandrel wall cap. There are +/- 1" steel posts with steel chain link railing spanning across the bridge. The railing does not meet current design standards and provides minimal protection for an errant vehicle. (See photos #5-6)

Both the North and South concrete leveling pads have areas with broken/deteriorated sections. (See photos #7-8)

The brick masonry posts base have areas with deterioration and broken/missing bricks.

tem 36b - Transitions

All approaches do not have any transition guardrail connecting to the bridge rail.

tem 36c - Approach Guardrail

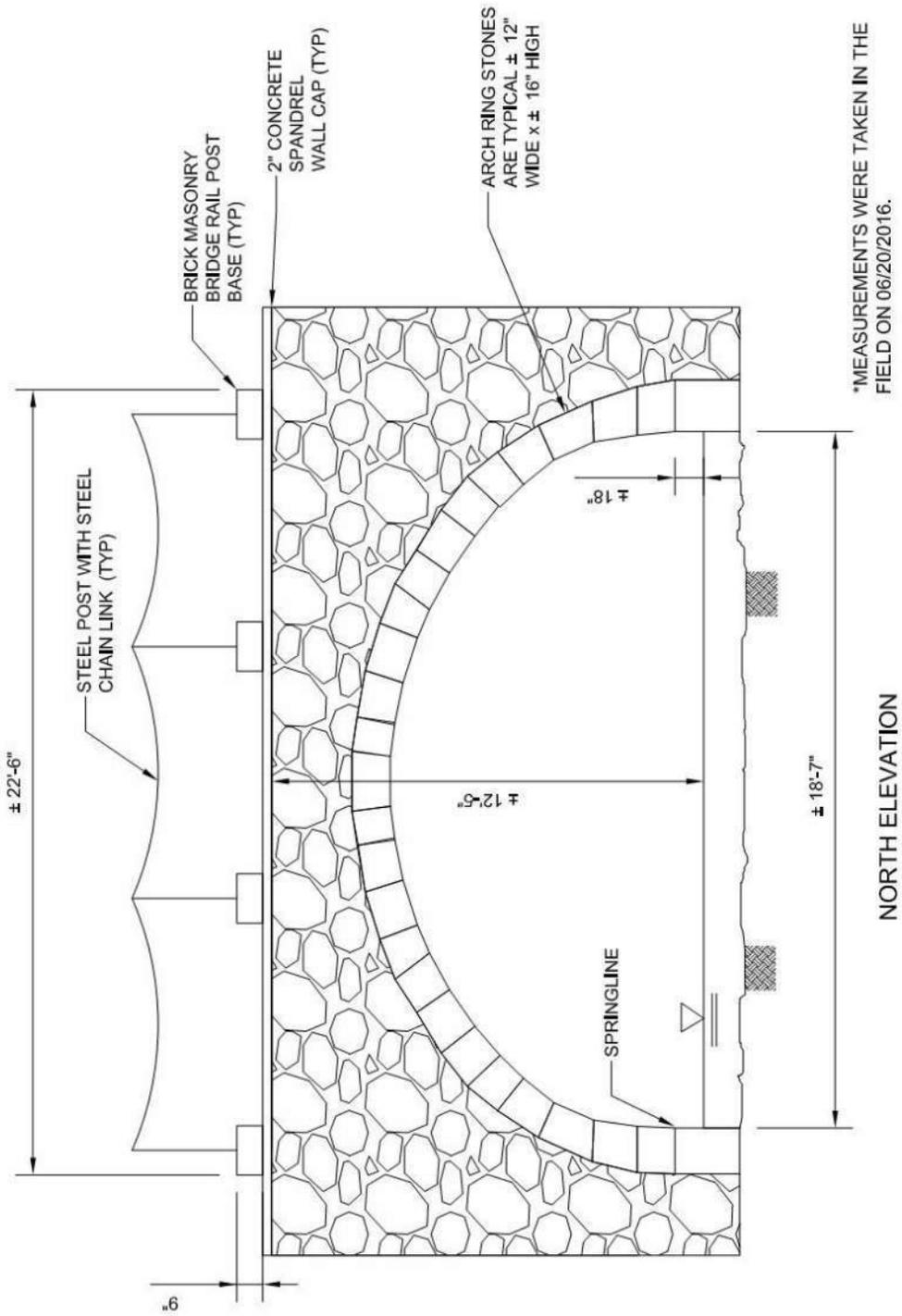
CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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REMARKS

Sketch 1 : Plan View
Sketch 2 : Cross Section Looking West
Sketch 3 : North Elevation
Photo 1 : Arch Crown Underside Exposed Efflorescence
Photo 2 : Underside of Arch (Easterly End)
Photo 3 : Underside of Arch (Westerly Side)
Photo 4 : Typical Wingwall Condition
Photo 5 : South Bridge Rail
Photo 6 : North Bridge Rail
Photo 7 : North Bridge Rail Concrete Leveling Pad Deteriorated/Broken Section
Photo 8 : South Bridge Rail Concrete Leveling Pad Deteriorated/Broken Section

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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SKETCHES



Sketch 3: North Elevation

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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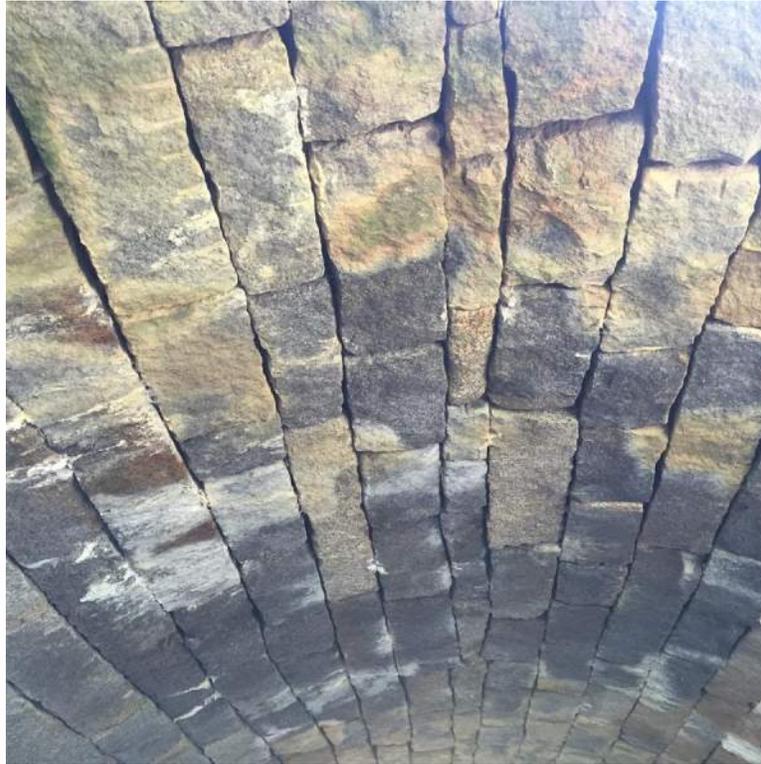
PHOTOS

Photo 1: Arch Crown Underside Exposed Efflorescence



Photo 2: Underside of Arch (Easterly End)

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS

Photo 3: Underside of Arch (Westerly Side)



Photo 4: Typical Wingwall Condition

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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PHOTOS



Photo 5: South Bridge Rail



Photo 6: North Bridge Rail

CITY/TOWN ROWLEY	B.I.N. 8BM	BR. DEPT. NO. R-11-007	8.-STRUCTURE NO. R11007-8BM-MUN-BRI	INSPECTION DATE JUN 20, 2016
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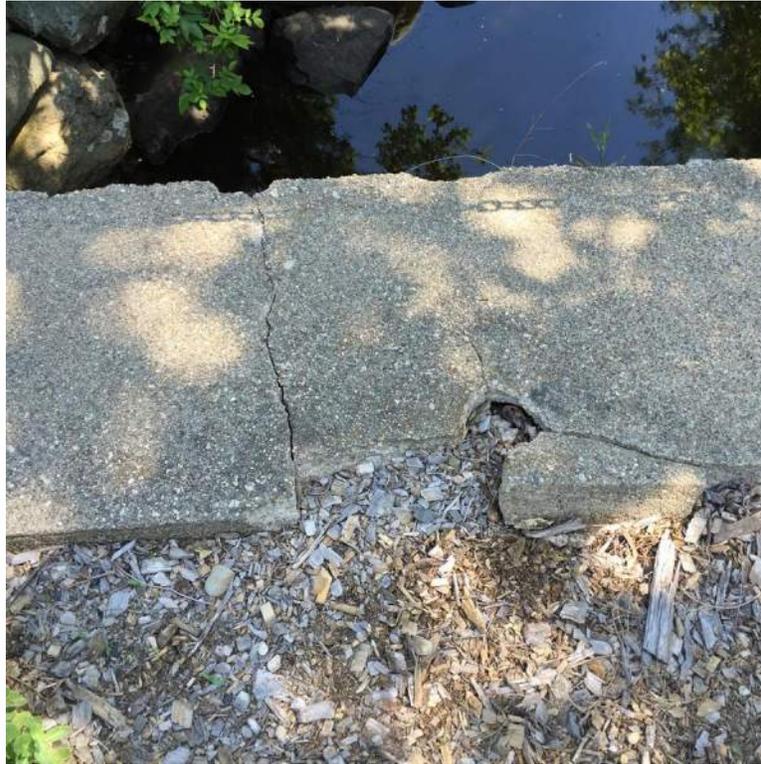
PHOTOS

Photo 7: North Bridge Rail Concrete Leveling Pad Deteriorated/Broken Section



Photo 8: South Bridge Rail Concrete Leveling Pad Deteriorated/Broken Section

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
B7Y

ROUTINE INSPECTION

BR. DEPT. NO.
R-11-008

CITY/TOWN ROWLEY	8.-STRUCTURE NO. R11008-B7Y-MUN-NBI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE SEP 13, 2017
07-FACILITY CARRIED HWY WETHERSFIELD	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 2009	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER MILL RIVER	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 107 : Concrete Frame	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER P. Burke	
107-DECK TYPE 2 : Concrete Precast Panels	WEATHER Clear	TEMP. (air) 27°C	TEAM MEMBERS A. POWER	

ITEM 58	8	
DECK		DEF
1. Wearing surface	7	-
2. Deck Condition	8	-
3. Stay in place forms	N	-
4. Curbs	8	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	8	-
9. Anti Missile Fence	N	-
10. Drainage System	8	-
11. Lighting Standards	N	-
12. Utilities	N	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-
CURB REVEAL (In millimeters)	N 165	S 175

APPROACHES		DEF
a. Appr. pavement condition	7	-
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge)	(Y/N)	N
		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59	8	
SUPERSTRUCTURE		DEF
1. Concrete Rigid Frame	8	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Girders or Beams	N	-
5. Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6. Pin & Hangers	N	-
7. Conn Plt's, Gussets & Angles	N	-
8. Cover Plates	N	-
9. Bearing Devices	N	-
10. Diaphragms/Cross Frames	N	-
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Member Alignment	8	-
14. Paint/Coating	N	-
15.	N	-

Year Painted **N**

COLLISION DAMAGE: Please explain
None (X) Minor () Moderate () Severe ()

LOAD DEFLECTION: Please explain
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: Please explain
None (X) Minor () Moderate () Severe ()

Any Fracture Critical Member: (Y/N) **N**

Any Cracks: (Y/N) **N**

ITEM 60	8	
SUBSTRUCTURE		DEF
1. Abutments	Dive	Cur
a. Pile Caps	N	H
b. Bridge Seats	N	N
c. Backwalls	N	N
d. Breastwalls	N	8
e. Wingwalls	N	8
f. Slope Paving/Rip-Rap	N	8
g. Pointing	N	N
h. Footings	N	N
i. Piles	N	H
j. Scour	N	8
k. Settlement	N	8
l.	N	N
m.	N	N
2. Piers or Bents		N
a. Pedestals	N	N
b. Caps	N	N
c. Columns	N	N
d. Stems/Webs/Pierwalls	N	N
e. Pointing	N	N
f. Footing	N	N
g. Piles	N	N
h. Scour	N	N
i. Settlement	N	N
j.	N	N
k.	N	N
3. Pile Bents		N
a. Pile Caps	N	N
b. Piles	N	N
c. Diagonal Bracing	N	N
d. Horizontal Bracing	N	N
e. Fasteners	N	N

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE:
None (X) Minor () Moderate () Severe ()

SCOUR: Please explain
None (X) Minor () Moderate () Severe ()

I-60 (Dive Report): **N** I-60 (This Report): **8**

93B-U/W (DIVE) Insp **00/00/0000**

CITY/TOWN ROWLEY	B.I.N. B7Y	BR. DEPT. NO. R-11-008	8.-STRUCTURE NO. R11008-B7Y-MUN-NBI	INSPECTION DATE SEP 13, 2017
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ITEM 61				8
CHANNEL & CHANNEL PROTECTION				
	Dive	Cur	DEF	
1.Channel Scour	N	8	-	
2.Embankment Erosion	N	8	-	
3.Debris	N	7	-	
4.Vegetation	N	6	-	
5.Utilities	N	X	-	
6.Rip-Rap/Slope Protection	N	8	-	
7.Aggradation	N	8	-	
8.Fender System	N	N	-	
STREAM FLOW VELOCITY: Tidal () High () Moderate () Low (X) None ()				
ITEM 61 (Dive Report): <input type="checkbox"/> N ITEM 61 (This Report): <input type="checkbox"/> 8				
93b-U/W INSP. DATE: <input type="text" value="00/00/0000"/>				

ITEM 36 TRAFFIC SAFETY				
	36	COND	DEF	
A. Bridge Railing	1	8	-	
B. Transitions	1	8	-	
C. Approach Guardrail	1	7	-	
D. Approach Guardrail Ends	1	7	-	
WEIGHT POSTING <i>Not Applicable</i> <input checked="" type="checkbox"/> X				
	H	3	3S2	Single
Actual Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Recommended Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Waived Date:	<input type="text" value="00/00/0000"/>		EJDMT Date:	<input type="text" value="00/00/0000"/>
	At bridge	Other Advance		
Signs In Place	E	W	E	W
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CLEARANCE POSTING				
	N	S		
Actual Field Measurement	ft	in	ft	in
Posted Clearance	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	0	0	0	0
	0	0	0	0
	At bridge		Advance	
Signs In Place	N	S	N	S
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ACCESSIBILITY (Y/N/P)		
	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:	<input type="text"/>	<input type="text"/>
	N	N
TOTAL HOURS <input type="text" value="8"/>		
PLANS (Y/N): <input type="checkbox"/> Y		
(V.C.R.) (Y/N): <input type="checkbox"/> N		
TAPE#: _____		
<i>List of field tests performed:</i>		

RATING
Rating Report (Y/N): <input type="checkbox"/> Y
Date: <input type="text" value="12/01/2014"/>
Inspection data at time of existing rating I 58: 8 I 59: 8 I 60: 8 Date :09/24/2013

(To be filled out by DBIE)		If YES please give priority:
Request for Rating or Rerating (Y/N): <input type="checkbox"/> N	<input type="text" value="HIGH () MEDIUM () LOW ()"/>	
REASON: _____		

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE	
DEFICIENCY:	A defect in a structure that requires corrective action.
CATEGORIES OF DEFICIENCIES:	
M= Minor Deficiency	Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.
S= Severe/Major Deficiency	Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.
C-S= Critical Structural Deficiency	A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.
C-H= Critical Hazard Deficiency	A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.
URGENCY OF REPAIR:	
I = Immediate-	[Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].
A = ASAP-	[Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].
P = Prioritize-	[Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN ROWLEY	B.I.N. B7Y	BR. DEPT. NO. R-11-008	8.-STRUCTURE NO. R11008-B7Y-MUN-NBI	INSPECTION DATE SEP 13, 2017
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REMARKS

According to the design plans:
 Approaches and abutments are West and East.
 Elevations are North and South.
 This is a simple span precast concrete reinforced rigid frame.
 Mill River flows from South to North.

TEM 58 - DECK

tem 58.1 - Wearing surface

Minor transverse cracking at both east and west ends of the deck.

Minor longitudinal cracking in the eastbound roadway.

APPROACHES

Approaches a - Appr. pavement condition

Minor intermittent transverse and longitudinal cracking throughout east approach.

TEM 61 - CHANNEL AND CHANNEL PROTECTION

tem 61.4 - Vegetation

Heavy vegetation growing at upstream end partially restricting flow.

TRAFFIC SAFETY

tem 36a - Bridge Railing

Both sides of structure have Type "T101" Modified Bridge Rails.

tem 36b - Transitions

Continuation of type "ss" guardrail.

tem 36c - Approach Guardrail

All four corners have Type "ss" Highway Guard Rail. Some spacer blocks are loose and misaligned. (Photo)

tem 36d - Approach Guardrail Ends

Northwest and southeast have boxing glove ends with minor scrapes.

Northwest endpost is rotated toward roadway. (Photo 2)

The southwest and northeast have buried ends with minor scrapes and dents.

Photo Log

Photo 1 : Loose and misaligned guardrail spacer block.

Photo 2 : Northwest guardrail end post rotated towards roadway.

CITY/TOWN ROWLEY	B.I.N. B7Y	BR. DEPT. NO. R-11-008	8.-STRUCTURE NO. R11008-B7Y-MUN-NBI	INSPECTION DATE SEP 13, 2017
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PHOTOS

Photo 1: Loose and misaligned guardrail spacer block.



Photo 2: Northwest guardrail end post rotated towards roadway.

National Bridge Element Inspection

BDEPT# **R-11-008**

Date **09/13/2017**

B.I.N. **B7Y**

District Bridge Inspection Engr **Thomas G. Weil**

Item 8 **R11008-B7Y-MUN-NBI**

Inspecting Agency **Mass. Highway Dept.**

Span Group **1**

Team Leader **Patrick Burke**

Town **Rowley**

Team **Adam Power**

District **4**

Member(s)

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
12	Re Concrete Deck	sq feet	2	616.000	<input type="checkbox"/> %	616.000			
Notes :									
> 510	Wearing Surfaces	sq feet	2	528.000	<input type="checkbox"/> %	498.000	30.000		
Notes :									
> > 3220	<i>Crack (Wearing Surface)</i>	sq feet	2	50.000	<input type="checkbox"/> %	20.000	30.000		
Notes :									
215	Re Conc Abutment	feet	2	56.000	<input type="checkbox"/> %	56.000			
Notes :									
321	Re Conc Approach Slab	sq feet	2	720.000	<input type="checkbox"/> %	720.000			
Notes :									
330	Metal Bridge Railing	feet	2	44.000	<input type="checkbox"/> %	44.000			
Notes :									

STRUCTURES INSPECTION FIELD REPORT

2-DIST
04

B.I.N.
B80

ROUTINE INSPECTION

BR. DEPT. NO.
R-11-009

CITY/TOWN ROWLEY	8-STRUCTURE NO. R11009-B80-MUN-NBI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE SEP 11, 2017
07-FACILITY CARRIED HWY WETHERSFIELD	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 2009	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER BACHELDER BROOK	26-FUNCTIONAL CLASS Urban Local	DIST. BRIDGE INSPECTION ENGINEER T. G. Weil		
43-STRUCTURE TYPE 107 : Concrete Frame	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER J. Dideo	
107-DECK TYPE 2 : Concrete Precast Panels	WEATHER clear	TEMP. (air) 22°C	TEAM MEMBERS A. POWER	

ITEM 58 7

DECK DEF

1. Wearing surface	7	-
2. Deck Condition	7	-
3. Stay in place forms	N	-
4. Curbs	7	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets	N	-
8. Railing	7	-
9. Anti Missile Fence	N	-
10. Drainage System	N	-
11. Lighting Standards	N	-
12. Utilities	N	-
13. Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)

N	S
150	150

ITEM 59 7

SUPERSTRUCTURE DEF

1. Stringers	N	-
2. Floorbeams	N	-
3. Floor System Bracing	N	-
4. Concrete Rigid Frame	7	-
5. Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6. Pin & Hangers	N	-
7. Conn Plt's, Gussets & Angles	N	-
8. Cover Plates	N	-
9. Bearing Devices	N	-
10. Diaphragms/Cross Frames	N	-
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Member Alignment	7	-
14. Paint/Coating	N	-
15.	N	-

Year Painted N

COLLISION DAMAGE: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD DEFLECTION: *Please explain*
None (X) Minor () Moderate () Severe ()

LOAD VIBRATION: *Please explain*
None (X) Minor () Moderate () Severe ()

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 8

SUBSTRUCTURE DEF

1. Abutments	Dive	Cur	8	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Pile Caps	N	8		-
e. Wingwalls	N	8		-
f. Slope Paving/Rip-Rap	N	8		-
g. Pointing	N	N		-
h. Footings	N	H		-
i. Piles	N	H		-
j. Scour	N	8		-
k. Settlement	N	8		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain N

COLLISION DAMAGE:
None (X) Minor () Moderate () Severe ()

SCOUR: Please explain
None (X) Minor () Moderate () Severe ()

I-60 (Dive Report): N I-60 (This Report): 8

93B-U/W (DIVE) Insp 00/00/0000

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN ROWLEY	B.I.N. B80	BR. DEPT. NO. R-11-009	8.-STRUCTURE NO. R11009-B80-MUN-NBI	INSPECTION DATE SEP 11, 2017
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ITEM 61				7
CHANNEL & CHANNEL PROTECTION				
	Dive	Cur	DEF	
1.Channel Scour	N	7	-	
2.Embankment Erosion	N	7	-	
3.Debris	N	8	-	
4.Vegetation	N	7	-	
5.Utilities	N	X	-	
6.Rip-Rap/Slope Protection	N	7	-	
7.Aggradation	N	7	-	
8.Fender System	N	N	-	
STREAM FLOW VELOCITY: Tidal () High () Moderate () Low (X) None ()				
ITEM 61 (Dive Report): <input type="checkbox"/> N ITEM 61 (This Report): <input type="checkbox"/> 7				
93b-U/W INSP. DATE: <input type="text" value="00/00/0000"/>				

ITEM 36 TRAFFIC SAFETY				
	36	COND	DEF	
A. Bridge Railing	1	7	-	
B. Transitions	1	8	-	
C. Approach Guardrail	1	8	-	
D. Approach Guardrail Ends	0	8	-	
WEIGHT POSTING <i>Not Applicable</i> <input checked="" type="checkbox"/> X				
	H	3	3S2	Single
Actual Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Recommended Posting	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N	<input type="checkbox"/> N
Waived Date:	<input type="text" value="00/00/0000"/>		EJDMT Date:	<input type="text" value="00/00/0000"/>
	At bridge	Other Advance		
Signs In Place	E	W	E	W
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CLEARANCE POSTING				
	N	S		
Actual Field Measurement	ft	in	ft	in
Posted Clearance	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	0	0	0	0
	0	0	0	0
	At bridge		Advance	
Signs In Place	N	S	N	S
(Y=Yes,N=No, NR=Not Required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Legibility/Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ACCESSIBILITY (Y/N/P)		
	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:	<input type="text"/>	<input type="text"/>
	N	N
TOTAL HOURS <input type="text" value="8"/>		
PLANS (Y/N): <input type="checkbox"/> Y		
(V.C.R.) (Y/N): <input type="checkbox"/> N		
TAPE#: _____		
List of field tests performed: Hands on routine inspection		

RATING	
Rating Report (Y/N):	<input type="checkbox"/> Y
Date:	<input type="text" value="09/01/2013"/>
Inspection data at time of existing rating I 58: 8 I 59: 8 I 60: 8 Date :09/09/2011	

(To be filled out by DBIE)	
Request for Rating or Rerating (Y/N):	<input type="checkbox"/> N
If YES please give priority:	
HIGH () MEDIUM () LOW ()	
REASON: _____	

CONDITION RATING GUIDE			(For Items 58, 59, 60 and 61)
CODE	CONDITION	DEFECTS	
N	NOT APPLICABLE		
G 9	EXCELLENT	Excellent condition.	
G 8	VERY GOOD	No problem noted.	
G 7	GOOD	Some minor problems.	
F 6	SATISFACTORY	Structural elements show some minor deterioration.	
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.	
P 4	POOR	Advanced section loss, deterioration, spalling or scour.	
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.	
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.	
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.	
0	FAILED	Out of service - beyond corrective action.	

DEFICIENCY REPORTING GUIDE	
DEFICIENCY: A defect in a structure that requires corrective action.	
CATEGORIES OF DEFICIENCIES:	
M= Minor Deficiency	- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.
S= Severe/Major Deficiency	- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.
C-S= Critical Structural Deficiency	- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.
C-H= Critical Hazard Deficiency	- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.
URGENCY OF REPAIR:	
I = Immediate-	[Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].
A = ASAP-	[Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].
P = Prioritize-	[Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

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REMARKS

This is a simple span precast concrete reinforced rigid frame superstructure.
 The approaches are West and East.
 The elevations are South and North.
 Bachelder Brook flows South to North.
 For the purpose of this report, rigid frame sections are labeled from South to North.

TEM 58 - DECK

tem 58.4 - Curbs

South curb has minor scrapes throughout. (**Photo 1**)

TEM 59 - SUPERSTRUCTURE

tem 59.4 - Concrete Rigid Frame

The concrete structure is in good condition.

The west wall of the rigid frame has loose joint filler between Sections 2 and 3. (**Photo 2**)

The east wall of the rigid frame has loose joint filler at the interface of Sections 1 and 2, Sections 2 and 3, and Sections 3 and 4. (**Photo 3**)

The frame roof has a number of minor spalls throughout. (**Photo 4**)

The north face of rigid frame Section 4 has minor hairline cracks at midspan. (**Photo 5**)

tem 59.13 - Member Alignment

The interface between rigid frame Sections 2 and 3 shows minor misalignment at the east end. (**Photo 6**)

TRAFFIC SAFETY

tem 36a - Bridge Railing

Both sides of bridge have Type T101, modified bridge railings. (**Photo 7**)

tem 36b - Transitions

Continuation of Type "ss" guardrail with wood posts spaced properly.

tem 36c - Approach Guardrail

All four corners have type "ss" guardrail.

tem 36d - Approach Guardrail Ends

Northeast and southwest ends are buried.

Southeast and northwest have boxing glove ends.

Photo Log

- Photo 1 : South curb has minor scrapes throughout
 Photo 2 : West wall has loose joint filler between rigid frame sections 2 and 3.
 Photo 3 : East wall has loose joint filler between rigid frame sections 1 and 2, 2 and 3, and 3 and 4.

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PHOTOS

Photo 1: South curb has minor scrapes throughout



Photo 2: West wall has loose joint filler between rigid frame sections 2 and 3.

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PHOTOS

Photo 3: East wall has loose joint filler between rigid frame sections 1 and 2, 2 and 3, and 3 and 4.



Photo 4: Spall at plastic insert in rigid frame section 3 near north east corner

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PHOTOS

Photo 5: North face of rigid frame section 4 has minor hairline cracks at midspan



Photo 6: Misalignment of approx. 1/2" at the interface of rigid frame sections 2 and 3 near east wall

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PHOTOS

Photo 7: Type T101 modified bridge railing; Typical.

National Bridge Element Inspection

BDEPT# **R-11-009**

Date **09/11/2017**

B.I.N. **B80**

District Bridge Inspection Engr **Thomas G. Weil**

Item 8 **R11009-B80-MUN-NBI**

Inspecting Agency **Mass. Highway Dept.**

Span Group **1**

Team Leader **Joseph Dideo**

Town **Rowley**

Team **Adam Power**

District **4**

Member(s)

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
38	Re Concrete Slab	sq feet	2	616.000	<input type="checkbox"/> %	606.000	10.000		
Notes :									
> 1080	<i>Delamination/Spall/Patched Area</i>	sq feet	2	10.000	<input checked="" type="checkbox"/> %		100.00		
Notes :									
> 510	Wearing Surfaces	sq feet	2	528.000	<input type="checkbox"/> %	528.000			
Notes :									
215	Re Conc Abutment	feet	2	60.500	<input type="checkbox"/> %	60.500			
Notes :									
321	Re Conc Approach Slab	sq feet	2	720.000	<input type="checkbox"/> %	720.000			
Notes :									
330	Metal Bridge Railing	feet	2	40.000	<input type="checkbox"/> %	40.000			
Notes :									
> 515	Steel Protective Coating	sq feet	2	80.000	<input type="checkbox"/> %	80.000			
Notes : Galvanized steel railing									

Appendix B

Bridge Summary

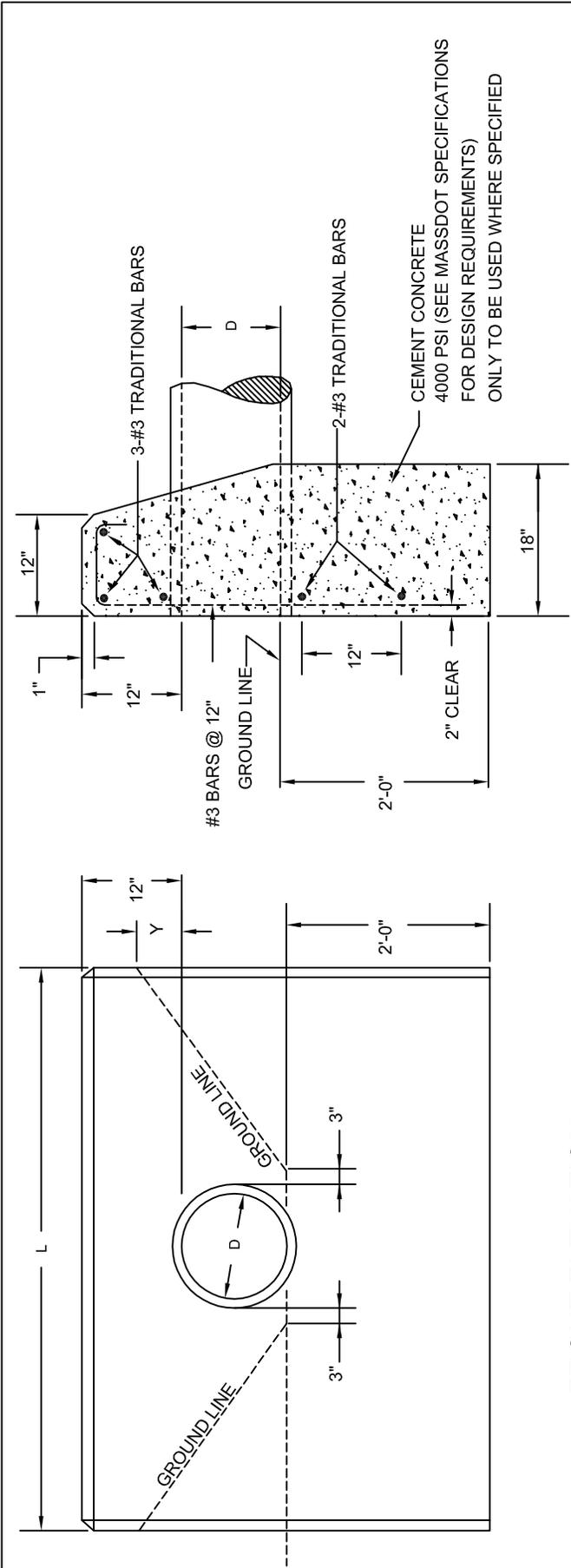
Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Cover Depth	Wearing Surface	Railing	Year Built	Flooding Issue	Scour Issues/Undermining	Channel Condition Upstream/Downstream	Overall Condition	Immediate Repairs Required	Notes	
1		Bennett Hill Rd.	N/A	Stone	Single Culvert	24" dia.	3 ft	Asphalt	US - wood DS - none	N/A	NO	None	7	6	Remove vegetation from channel	Difficult access due to vegetation	
2		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	3 ft	Asphalt	None	N/A	NO	None Visible	6	6	Upstream - very heavy vegetation and debris	Culvert is almost full with sediment, dry laid stone headwalls satisfactory	Clean culvert of sediment, and channel of debris and vegetation.
3		Boxford Rd.	N/A	Pipe (Metal)	Single Culvert	30" dia.	2.5 ft	Asphalt	None	N/A	YES	None Visible	6	6	Downstream, moderate debris, incl. Large trees	Clean debris from channel, remove tree at DS headwall, rebuild both headwalls.	SDS headwall has 5" +/- tree growing on top. Both stone headwalls have loose or settled stones
4		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	2 ft	Asphalt	None	2006	YES	Both ends of pipe are undermined	6	6	Moderate debris DS	Clear vegetation and debris, monitor undermining at pipe ends	Plastic pipe generally good condition, but damaged on upstream end. No headwalls, loose stone laid on down stream end.
5		Bradford St.	N/A	Pipe (Clay)	Single Culvert	24" dia.	4 ft	Asphalt	US - wood DS - none	N/A	NO	None	N/A	6	Downstream is a pond	ungROUTED masonry headwall and channel outlet. Inlet headwall is failing (ungROUTED stone) Pipe half filled with sediment. Pavement is in poor condition.	
6		Central St.	N/A	Granite Slabs/30" CMP at outlet	Single Culvert	48" W x 30" H	< 1' at ends, 3' middle	Asphalt	US - guardrail DS - wood	N/A	YES	Minor @ pipe at inlet	5	6	Channel is constricted with rocks/debris	Rusting and section loss at inlet. Partial collapsing of outlet headwall (missing stones). Flooding issues due to heavy rain.	
7		Central St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	2 ft	Asphalt	US - none DS - wood	N/A	YES	None	7	5	Pond upstream and downstream	Grout stones at outlet headwall. Remove debris	Headwall at outlet is leaning. Inlet at pond on private property
8		Central St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	6 ft	Asphalt	None	N/A	NO	Some flow under pipe	6	6	Rock and debris in channel	Corrosion and section loss for first 5' of pipe. Headwalls are concrete	
9		Christopher Rd.	N/A	Pipe (Metal)	Single Culvert	36" dia.	3 ft	Asphalt	None	N/A	NO	None	7	7		Vertical crack in downstream headwall. Inlet on private property	
10		Cross St.	N/A	Concrete/Granite	Slab	63" W x 48" H	< 1 ft	Asphalt	US - wire DS - wood	N/A	NO	None	7	7		Masonry abutment with granite slab. Last 5' at downstream end is concrete abutments and slab.	
11		Cross St.	N/A	Pipe (Metal)	Single Culvert	24" dia.	3 ft	Asphalt	None	N/A	NO	minor at outlet	7	6		Some crushing of pipe at outlet (could have been at construction). Grouted masonry at inlet, dry stacked masonry at outlet	
12		Daniels Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	3 ft	Asphalt	None	N/A	YES	minor at US wingwall	6	5	Rebuild downstream headwall and wingwall	Bank erosion downstream. Appears downstream headwall and wingwall have collapsed	
13		Dodge Rd.	N/A	Pipe (Clay)	Single Culvert	28" W x 15" H	3 ft	Asphalt	None	N/A	NO	None	6	3	Replace	Appears headwall, wingwalls, and pipe have collapsed at outlet. Depression in road above pipe.	
14		Dodge Rd.	N/A	Pipe (Metal)	Single Culvert	24" dia.	5 ft	Asphalt	None	N/A	NO	None	N/A	7	Wetlands	Riprap slope at inlet, perched outlet. Minor erosion of outlet bank.	
15		Dodge Rd.	N/A	Pipe (Metal)	Double Culvert	2 - 12" dia.	4 ft	Asphalt	None	N/A	NO	None	6	5	Heavy debris in downstream channel	Gaps in stones at inlet and outlet. Perched outlet, bottom of pipe with 100% section loss for approx. 3' (water does not flow out end of pipe)	
16	R11005	Dodge Rd.	Mill River	Concrete	Arch-Deck			Asphalt		2009				7		See MassDOT Inspection Report for further information	
17	R11002	Glen St.	Mill River	Concrete	Arch-Deck			Asphalt		1850				4		See MassDOT Inspection Report for further information	
18		Haverhill St.	N/A	Pipe (Metal)	Single Culvert	24" dia	7ft	Asphalt	DS - metal gr US - metal gr	N/A	YES	None		5	Rebuild upstream headwall	Downstream end of pipe si rusted with minor section loss, wingwalls are spalled ans cracked. Upstream pipe not visible. Headwall condion is poor with spalling and sink hole behind.	

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Cover Depth	Wearing Surface	Railing	Year Built	Flooding Issue	Scour Issues/Undermining	Channel Condition Upstream/Downstream		Overall Condition	Immediate Repairs Required	Notes
19		Haverhill St.	N/A	Pipe (HDPE)	Single Culvert	18" dia	6ft	Asphalt	DS - metal gr US - none	N/A	YES	None	6	Heavy Veg. & Debris	6	Clean Debris at Portals	Pipe in good condition, downstream stone headwall in good condition, concrete upstream headwall has some spalling.
20		Haverhill St.	N/A	DS Pipe (Metal) US Pipe (Plastic)	Single Culvert	24" dia	7ft	Asphalt	DS - metal gr US - none	N/A	YES	Yes upstream wingwall			5	Repair upstream headwall	Upstream headwall in fair condition with some spalling. Roadway drains directly over headwall. Downstream headwall has minor spalling.
21		Haverhill St.	N/A	Concrete	Single Culvert	24" dia	7 ft	Asphalt	US - metal gr	N/A	NO	Yes sloped paving at upstream portal.	5	Channel meander US	4	Rebuild downstream headwall	Upstream headwall in good condition. Downstream headwall has failed.
22		Haverhill St.	N/A		Single Culvert			Asphalt	none	N/A	NO					Clear vegetation up stream for better access. Scope upstream portal.	Upstream (N) is very heavily vegetated, limited access to obtain info on the culvert. Channel appears to drop upon entering upstream. Could not find down stream portal.
23		Haverhill St.	Batchelder Brook				4 ft	Asphalt	Metal gr	N/A	YES	None Visible	6	Vegetation and debris		Re-inspect during lower flow period	Culvert completely submerged.
24		Haverhill St.	N/A	Concrete	Single Culvert	30" dia.	2.5 ft	Asphalt	Metal gr	N/A	YES	None Visible	6	Vegetation and debris	5	Repair US headwall	Upstream pipe submerged in water, not visible. Mortared stone headwall in good condition. Downstream pipe was 90% full. Stone headwall has failed.
25		Haverhill St.	Mill River	TBD	TBD	TBD		Asphalt	DS - metal gr US - metal gr	N/A	YES	None Visible	6	Minor debris US		Revisit culvert during period of low flow to better identify.	Due to high water and heavy debris, culvert was not visible at either end.
26		Hillside St.	N/A	Pipe (Metal)	Single Culvert	36" dia.	< 1 ft	Asphalt	None	N/A	YES	None	7		7		Concrete headwall and wingwalls at inlet. Masonry at outlet. Floods frequently
27		Hillside St.	N/A	Pipe	Single Culvert	Could not measure	3 ft	Asphalt	None	N/A	NO	unknown	6		4	Rebuild headwalls	Inlet and outlet headwalls have completely collapsed
28		Independent St.	Ox Pasture Brook		Opened Bottom Arch	44" W x 24" H	2 ft	Asphalt	Guardrail	N/A	YES	None	6	Heavy vegetation	4	Reconstruct headwall and wingwall, remove debris	Erosion behind headwall and wing at inlet and outlet. Partial collapse of upstream wingwalls. UngROUTED masonry. Fills up during heavy rain but no overtopping.
29		Newbury Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	2 ft	Asphalt	None	N/A	NO	None	N/A		7		Inlet is steel grate and drop inlet. Outlet to riprap apron and field. Asphalt on top is rutted and patched.
30		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	12" dia.	2 ft	Asphalt	None	N/A	YES	None	7	Riprap upstream	7		UngROUTED masonry headwall and wingwalls at inlet and outlet. (dry during field visit)
31		Newbury Rd.	N/A	Pipe (Metal)	Single Culvert	unknown	3 ft	Asphalt	None	N/A	NO	None	7		5	Uncover inlet and outlet	Inlet headwall is missing, outlet headwall is not visible. Riprap slopes around outlet
32		Pleasant St.	N/A	not visible	Single Culvert	Could not measure	2 ft	Asphalt	US - wood DS - none	N/A	NO	None	7		5	Repair headwall, remove sediment	Headwall at outlet has collapsed. Inlet is partially blocked with sediment.
33		Prospect St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	2 ft	Asphalt	Low stone parapet	N/A	NO	None	7		8		Grouted masonry headwall and wings
34		School St.	N/A	Masonry/ Concrete	Single Culvert	50" W x 50" H	4 ft	Asphalt	Wood	N/A	NO	Minor at DS wingwall	7	Minor bank erosion	6	Repair sidewalk, downstream side	Headwall at inlet is leaning outwards. Some need of repointing. Cracks in asphalt.
35		Summer St.	N/A	Pipe (Concrete/ Clay)	Single Culvert	24" dia. Clay @ inlet, 36" dia. Conc. @ outlet	3 ft	Asphalt	US - none DS - wood	N/A	NO	None	6	Some large rocks in channel	7		Minor erosion behind inlet wingwall. Additional 15" dia. Conc. Pipe at outlet from nearby drop inlet.
36		Turcotte Mem. Dr.	N/A	Pipe (Concrete)	Double Culvert	2 - 46" dia.	12 ft	Asphalt	Wood guardrail	N/A	NO	None	7		8		North pipe blocked with debris.

Town ID No.	MassDOT Bridge No.	Feature Carried	Feature Intersected	Structure Material	Structure Type	Hydraulic Opening	Cover Depth	Wearing Surface	Railing	Year Built	Flooding Issue	Scour Issues/Undermining	Channel Condition Upstream/Downstream		Overall Condition	Immediate Repairs Required	Notes
37		West Ox Pasture Ln.	N/A	Pipe (Poly)	Single Culvert	12" dia.	1 ft	Compacted stone	None	2009	NO	None	N/A	Wetlands	8		Recently installed structure. Riprap slopes
38		Wethersfield St.	N/A	Pipe (Concrete)	Single Culvert	24" dia.	4 ft	Asphalt	Wood guardrail	N/A	NO	Minor at outlet	6		5	Remove trees behind headwall, rebuild inlet headwall	No pointing at outlet. Dislodged stones at inlet headwall, no pointing.
39	R11008	Wethersfield St.	Mill River	Concrete	Frame	24" dia.		Asphalt		2009					8		See MassDOT Inspection Report for further information
40	R11009	Wethersfield St.	Batchelder Brook	Concrete	Frame			Asphalt		2009					7		See MassDOT Inspection Report for further information
41		Wethersfield St.	N/A														Culvert is being replaced in 2018
42		Wilkes Rd.	N/A	Pipe (Concrete)	Double Culvert	2-15" dia.	12 ft	Asphalt	Conc. Parapet with metal rail	N/A	NO	None	N/A	Wetlands	8		Pipes at base of back-to-back retaining walls supporting road
43		Spencer Knowles Rd.	N/A	Pipe (Concrete)	Single Culvert	24" dia.		Asphalt	Conc. Parapet with wood rail	N/A	NO	None	7	Minor debris in channel	8		Minor cracks in parapet
44		Wethersfield St.	N/A	Pipe (Poly)	Single Culvert	14" dia.	2 ft	Asphalt	None	N/A	NO	None	7		6		Drains wetlands area. Dip in road over pipe. UngROUTED stones for headwall.
45		Haverhill St.	N/A		Single Culvert	12" est.	4 ft	Asphalt	DS - metal gr US none	N/A	NO	Not visible	6	Minor debris DS channel	6	Clean DS channel	Downstream (N) portal submerged in water, headwall fair, upstream portal appears to be CB.
46		Haverhill St.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	4 ft	Asphalt	DS - metal gr US - metal gr	N/A	NO	Not visible	6	Heavy veg US channel	6	Clean debris from pipe and DS channel	Upstream (N) portal submerged in water, headwall fair, downstream pipe is about 1/2 full of heavy debris.
47		Boxford Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	3.5 ft	Asphalt	None	N/A	NO	None	6	Heavy Vegetation and debris upstream	5	Remove tree at DS headwall and re-set stones. Clean channel of debris	DS Stone headwall has large tree and roots growing over it
48		Boxford Rd.	N/A	Pipe (Poly)	Single Culvert	24" dia	1.5 ft	Asphalt	None	N/A	NO	Not Visible	6	Heavy Vegetation upstream and downstream	6	Clear vegetation and debris	Pipe is in good condition, no headwall down stream., upstream headwall satisfactory
49		Wilkes Rd.	N/A	Pipe (Concrete)	Single Culvert	12" dia.	4 ft	Asphalt	US - none DS - wood	N/A	NO	None	N/A	Wetlands	6	Remove debris from inlet	Debris at inlet and no headwall. Stone headwall at outlet. (Dry during field visit)
50		Cindy Ln.	N/A	Pipe (Concrete)	Triple Culvert	3 - 30" dia.	4 ft	Asphalt	Wood guardrail	N/A	NO	None	N/A	Wetlands	7	Remove vegetation growing between pipes	Vegetation growing between pipes and on slopes.
51	R11007	Glen St. Ext.	Mill River	Masonry	Arch-Deck			Asphalt		2009					7		See MassDOT Inspection Report for further information
52	R11006	Mill Rd.	Mill River	Steel	Girder			Asphalt		1900					4		See MassDOT Inspection Report for further information

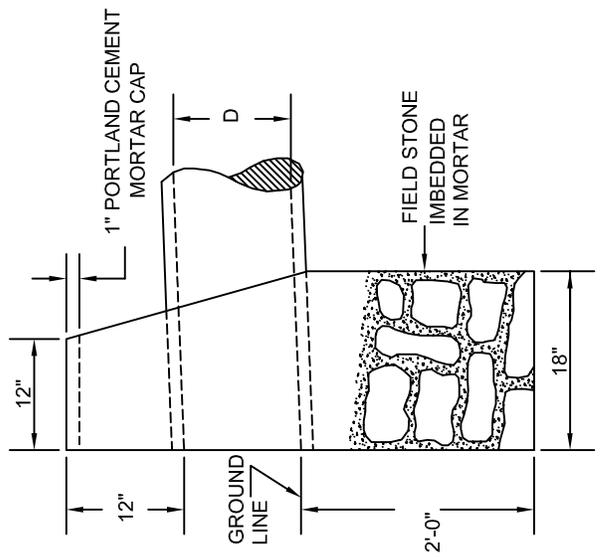
Appendix C

MassDOT Standard Construction Details (Headwalls)

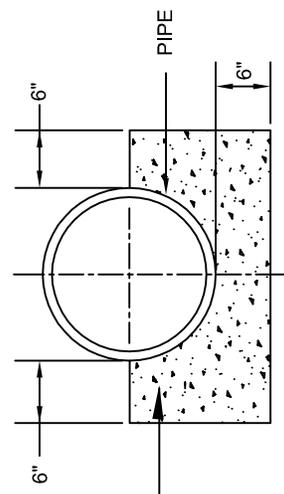


FRONT ELEVATION

END ELEVATION



END ELEVATION

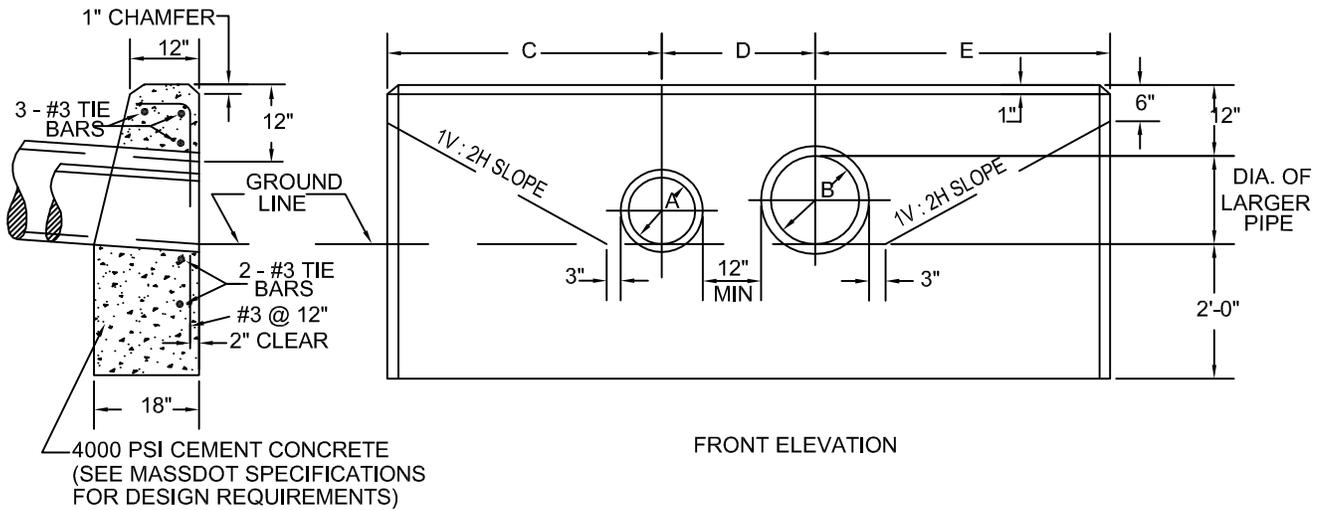


CONCRETE CRADLE FOR PIPE CULVERTS

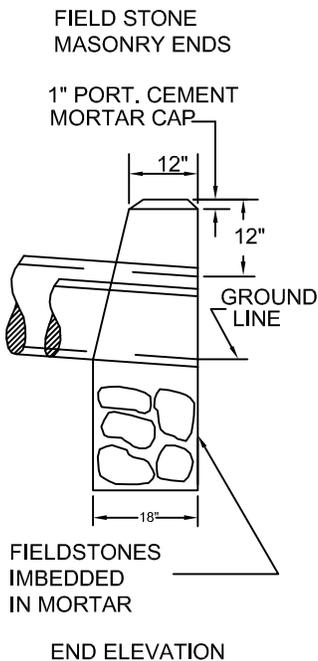
- NOTES:
1. FOR DESCRIPTIONS, MATERIALS AND CONSTRUCTION METHODS, SEE LATEST STANDARD SPECIFICATIONS.
 2. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
 3. PAYMENTS WILL BE BASED ON THE ACCOMPANYING TABLE.
 4. FOR QUANTITY TABLES SEE E 206.4.1

ENGLISH UNITS

PIPE DIAM. D	1 1/2 : 1 SLOPE				2 : 1 SLOPE				
	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	TRENCH EXCAV. 1'-0" DEPTH CU. FT.	L	CONC. OR F.S.M. CU. YDS.	STEEL LBS.	TRENCH EXCAV. 1'-0" DEPTH CU. FT.	
8"	4'-2"	0.77	15	21.60	5'-10"	1.08	21	27.40	
10"	4'-10"	0.92	20	23.91	6'-8"	1.28	23	30.35	
12"	5'-6"	1.08	21	26.25	7'-6"	1.49	29	33.25	
15"	6'-6"	1.34	24	29.75	8'-9"	1.82	32	37.63	
18"	7'-6"	1.61	30	33.25	10'-0"	2.18	39	42.00	
21"	8'-6"	1.95	34	37.35	11'-6"	2.62	43	47.25	
24"	9'-3"	2.16	35	39.38	12'-6"	2.97	50	50.75	
30"	10'-6"	2.63	44	43.75	15'-0"	3.86	62	59.50	
				4" FOR 1 1/2 : 1 SLOPE					
Y				6" FOR 2 : 1 SLOPE					



END ELEVATION



DESIGN NO.	DIAMETER (IN.)		LENGTHS			MASONRY (CY)	STEEL (LBS)	TRENCH EXCAV. 1'-0" DEPTH (CF)
	A	B	C	D	E			
1	12	12	3'-9"	2'-2"	3'-9"	1.89	37	40.85
2	12	15	4'-3"	2'-4"	4'-5"	2.27	42	45.50
3	12	18	4'-9"	2'-6"	5'-0"	2.66	48	49.88
4	12	21	5'-4"	2'-8"	5'-8"	3.12	54	54.85
5	12	24	5'-9"	2'-10"	6'-3"	3.54	59	58.91
6	12	30	6'-9"	3'-0"	7'-6"	4.48	71	67.38
7	15	15	4'-5"	2'-6"	4'-5"	2.32	41	46.66
8	15	18	4'-11"	2'-8"	5'-0"	2.72	48	51.03
9	15	21	5'-5"	2'-10"	5'-8"	3.16	54	55.72
10	15	24	5'-11"	3'-0"	6'-3"	3.60	60	60.10
11	15	30	6'-11"	3'-2"	7'-6"	4.54	72	68.53
12	18	18	5'-0"	2'-8"	5'-0"	2.72	48	51.35
13	18	21	5'-7"	2'-10"	5'-8"	3.17	52	56.28
14	18	24	6'-0"	3'-0"	6'-3"	3.58	60	60.38
15	18	30	7'-0"	3'-2"	7'-6"	4.53	72	68.85
16	21	21	5'-8"	3'-0"	5'-8"	3.20	53	57.19
17	21	24	6'-2"	3'-4"	6'-3"	3.69	61	62.13
18	21	30	7'-2"	3'-6"	7'-6"	4.65	73	70.60
19	24	24	6'-3"	3'-4"	6'-3"	3.67	61	62.40
20	24	30	7'-3"	3'-8"	7'-6"	4.69	74	64.47
21	30	30	7'-6"	4'-0"	7'-6"	4.76	75	73.50

NOTE:

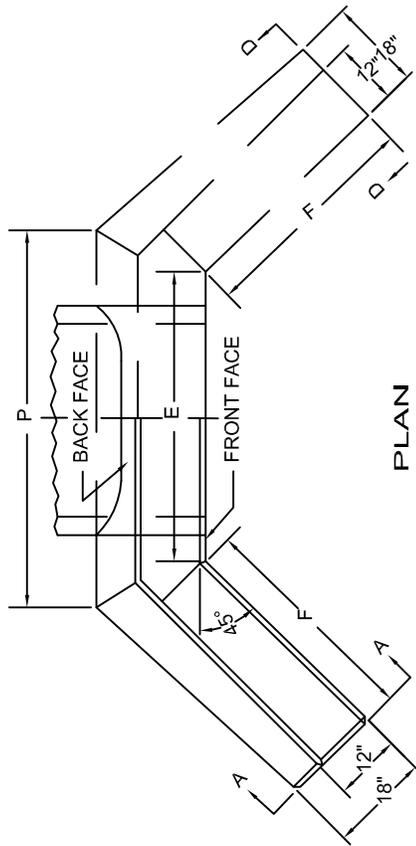
1. FOR DESCRIPTIONS, MATERIALS AND CONSTRUCTION METHODS, SEE STANDARD SPECIFICATIONS.
2. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
3. PAYMENTS WILL BE BASED ON THE QUANTITIES SHOWN IN ACCOMPANYING TABLE.

CONCRETE AND FIELDSTONE MASONRY PIPE ENDS FOR 30" TO 84" PIPE

DATE OF ISSUE
OCTOBER 2017

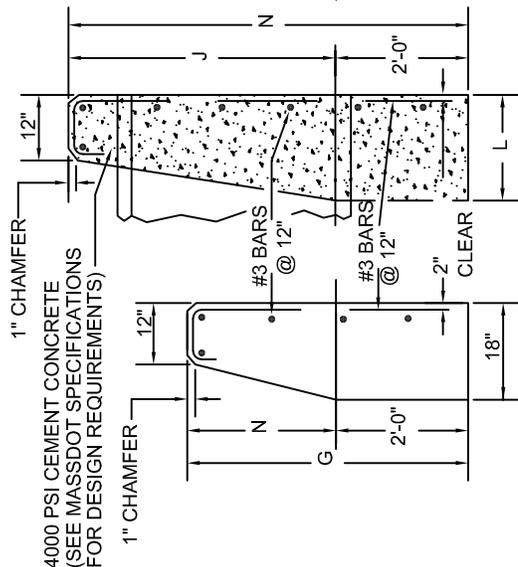
DRAWING NUMBER
E 206.6.0

- NOTE:
1. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHOD, SEE STANDARD SPECIFICATIONS.
2. ALL CONCRETE DIMENSIONS SHOWN ARE MINIMUM.
3. PAYMENTS WILL BE BASED ON THE QUANTITIES SHOWN IN THE ACCOMPANYING TABLE.



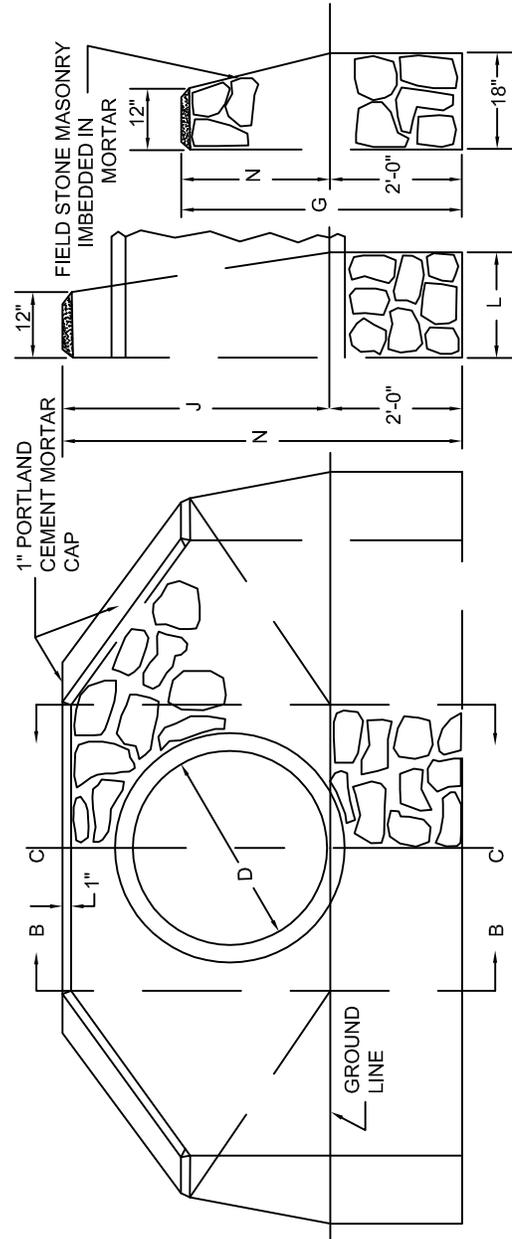
1V:1.5H AND 1V:2H SLOPES						1V:1.5H SLOPE		1V:2H SLOPE		TRENCH EXCAV. FOR 1/2 SLOPE
D	E	G	H	J	L	F	STEEL LBS	F	STEEL LBS	FOR 1'-0" DEPTH CU.FT.
DE	GH	JL	NP			CONC. MASONRY CY	STEEL LBS	CONC. MASONRY CY	STEEL LBS	FOR 1'-0" DEPTH CU.FT.
30"	4'-0"	4'-0"	5'-6"	3'-6"	1'-6"	3'-0"	45	4'-3"	54	55.16
36"	4'-6"	4'-3"	6'-0"	4'-0"	1'-8"	3'-6"	54	5'-0"	64	64.36
42"	5'-0"	4'-6"	6'-6"	4'-6"	1'-10"	4'-0"	59	5'-9"	70	73.70
48"	5'-6"	4'-9"	7'-0"	5'-0"	2'-0"	4'-6"	65	6'-8"	83	83.96
54"	6'-0"	5'-0"	7'-6"	5'-6"	2'-2"	5'-0"	73	7'-3"	93	94.46
60"	6'-6"	5'-3"	8'-0"	6'-0"	2'-4"	5'-6"	85	8'-0"	106	105.30
72"	7'-6"	5'-9"	9'-0"	7'-0"	2'-8"	6'-6"	98	9'-6"	128	128.92
84"	8'-6"	6'-3"	10'-0"	8'-0"	3'-0"	7'-6"	120	11'-0"	154	153.86

CONCRETE ENDS



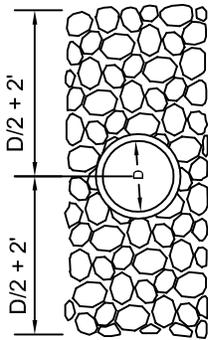
ELEV. A-A SECTION B-B

FIELD STONE MASONRY ENDS

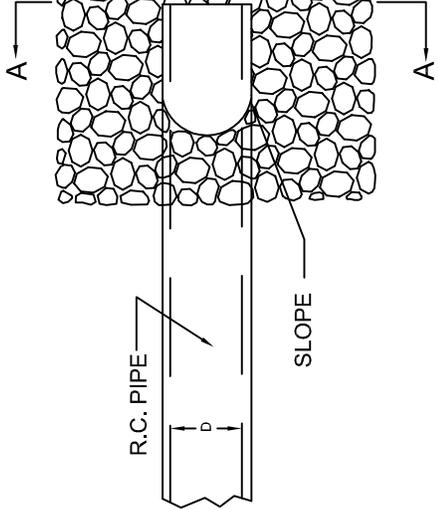


FRONT ELEVATION

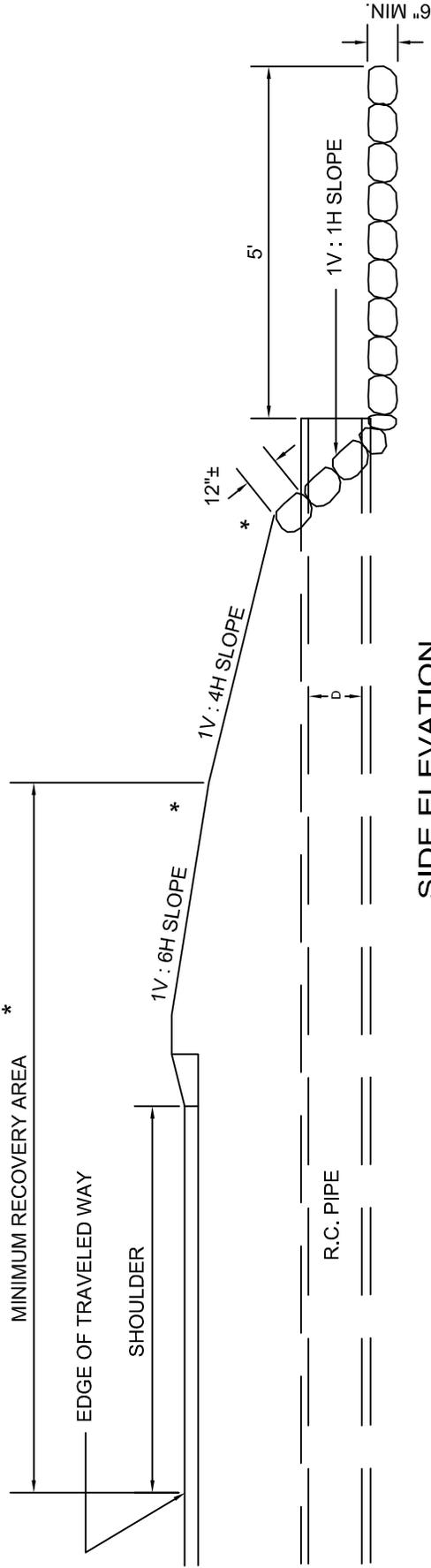
SECTION C-C ELEV. D-D



SECTION A-A



PLAN



SIDE ELEVATION

* SEE TYPICAL SECTIONS.

NOTES:

1. STONE TREATMENT OF PIPE ENDS SHALL NOT BE USED IN THE VEHICLE RECOVERY AREA.
2. MINIMUM MASS PER STONE = 50 LBS; MAXIMUM MASS PER STONE = 125 LBS.
3. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS, SEE STANDARD SPECIFICATIONS.

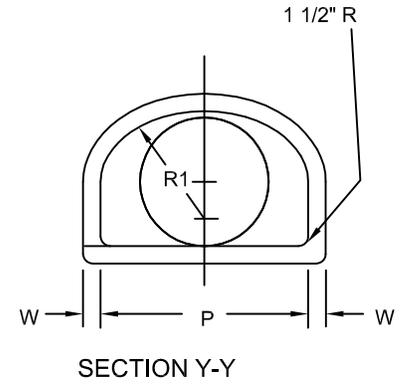
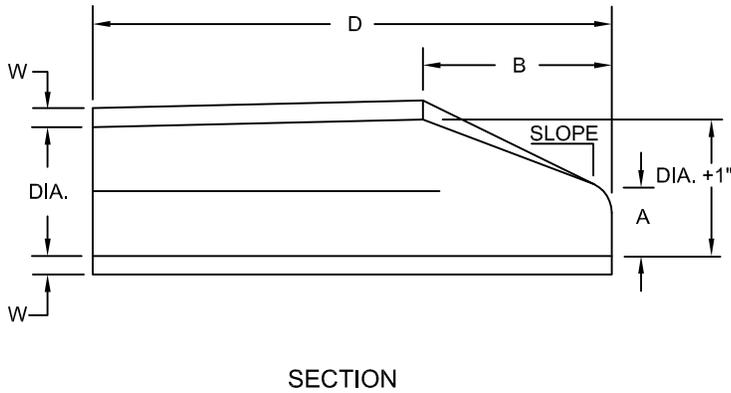
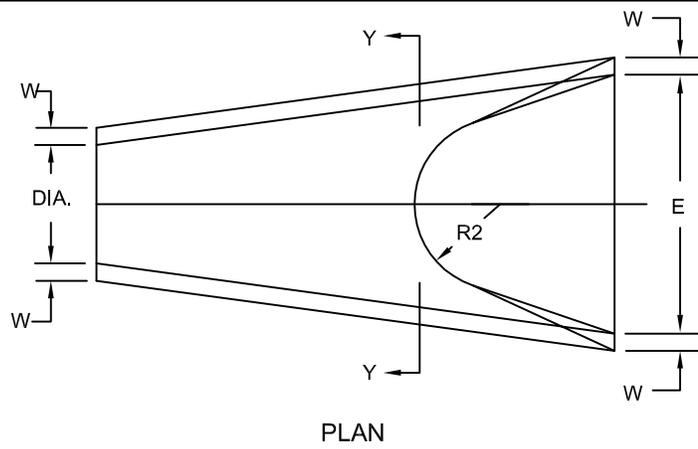


TABLE
[ALL DIMENSIONS ARE inches OR feet]

DIAMETER Inch	W	A	B	D	E	P	DIA. +1"	R1	R2	SLOPE
12"	2"	4"	2'-0"	6'-0"	2'-0"	19 15/16"	13"	10 1/8"	9"	1V : 3H
15"	2 1/4"	6"	2'-3"	6'-0"	2'-6"	24 5/16"	16"	12 1/2"	11"	1V : 3H
18"	2 1/2"	9"	2'-3"	6'-0"	3'-0"	29"	19"	15 1/2"	12"	1V : 3H
21"	2 3/4"	9"	2'-11"	6'-0"	3'-6"	31 5/8"	22"	16 1/8"	13"	1V : 3H
24"	3"	9 1/2"	3'-7 1/2"	6'-0"	4'-0"	33 3/16"	25"	16 13/16"	14"	1V : 3H
27"	3 1/4"	10 1/2"	4'-0"	6'-0"	4'-6"	36"	28"	18 9/16"	14 1/2"	1V : 3H
30"	3 1/2"	12"	4'-6"	6'-0"	5'-0"	37"	31"	18 1/2"	15"	1V : 3H
36"	4"	15"	5'-3"	8'-0"	6'-0"	47 13/16"	37"	24 5/16"	20"	1V : 3H
42"	4 1/2"	21"	5'-3"	8'-0"	6'-6"	53 7/8"	43"	27 1/2"	22"	1V : 3H
48"	5"	24"	6'-0"	8'-0"	7'-0"	56 1/2"	49"	28 1/2"	22"	1V : 3H

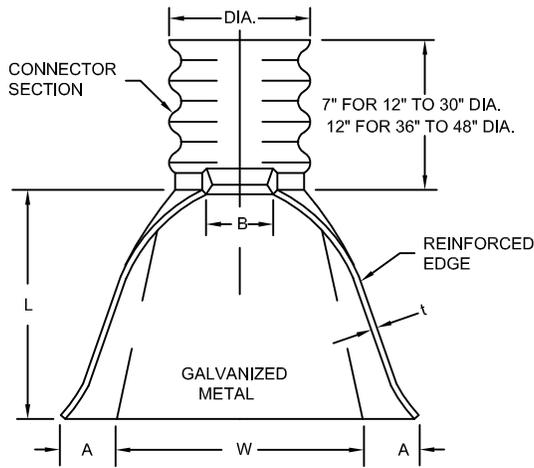
NOTES:

1. SEE STANDARD SPECIFICATIONS FOR THE TYPE OF PIPE TO BE USED (BELL & SPIGOT OR TONGUE & GROOVE)
2. SEE STANDARD SPECIFICATIONS FOR THE TYPE OF PIPE AND PLACING OF STEEL REINFORCEMENT.
3. THE JOINTS ARE TO BE COMPATIBLE WITH THE MAIN RUN OF PIPE.

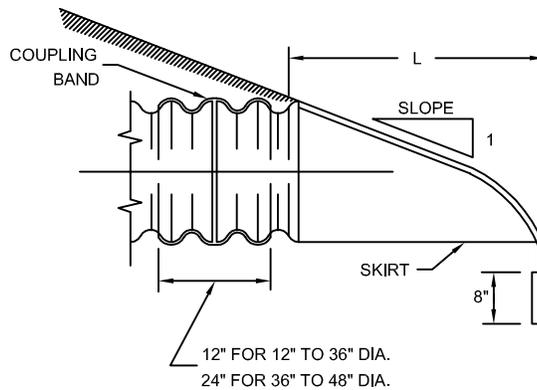
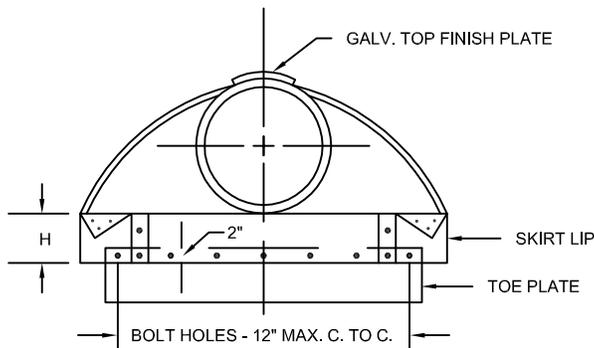


**REINFORCED CONCRETE PIPE
FLARED ENDS**

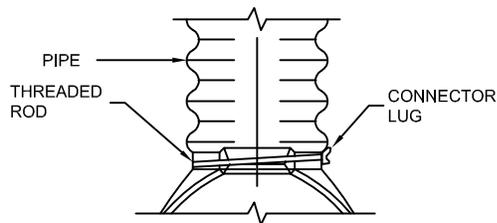
DATE OF ISSUE
OCTOBER 2017
DRAWING NUMBER
E 206.8.0



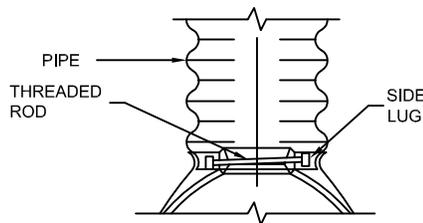
PIPE DIA. (IN)	GA.	DIMENSIONS (IN.)					APPROX. SLOPE
		A (± 1")	B (MAX.)	H (± 1")	L (± 1 1/2")	W (± 2")	
12	16	6	6	6	21	24	1V : 2.5H
15	16	7	8	6	26	30	1V : 2.5H
18	16	8	10	6	31	36	1V : 2.5H
21	16	9	12	6	36	42	1V : 2.5H
24	16	10	13	6	41	48	1V : 2.5H
30	14	12	16	8	51	60	1V : 2.5H
36	14	14	19	9	60	72	1V : 2.5H
42	12	16	22	11	39	84	1V : 2.5H
48	12	18	27	12	78	90	1V : 2.25H



ALTERNATE CONNECTIONS



FOR 12" TO 24" ONLY



FOR 30" AND 36" ONLY

NOTES:

1. TOE PLATE TO BE PUNCHED TO MATCH HOLES IN SKIRT LIP. 3/8" Ø GALVANIZED BOLTS TO BE FURNISHED. LENGTH OF TOE PLATE TO BE W+10" FOR 12" TO 30" DIA. PIPE AND W+22" FOR 36" TO 48" DIA.
2. SKIRT SECTION FOR 12" TO 24" DIA. PIPE TO BE MADE IN ONE PIECE. SKIRT SECTION FOR 12" TO 30" DIA. PIPE MAY BE MADE FROM TWO SHEETS JOINED BY RIVETING OR BOLTING ON CENTER LINE WITH 3/8" DIA. FASTENERS.
3. CONNECTOR SECTION, TOE PLATE AND SKIRT TO BE OF SAME THICKNESS METAL; EACH TO BE GALVANIZED AND COATED WITH A TAR BASE PAINT.
4. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHOD, SEE LATEST STANDARD SPECIFICATIONS.

Appendix D

Conceptual Cost Estimates

Town of Rowley Bridge and Culvert Evaluations:

Glen Street over Mill River (R-11-002)



Conceptual Cost Estimate

Scope of Work: Replace structure

Construction Costs

Items/ Description	Unit	Unit Cost	Quantity	Item Cost
Demolition (remove existing superstructure)	LS	\$ 50,000	1	\$ 50,000.00
Bridge Excavation	CY	\$ 40	180	\$ 7,200.00
Gravel Borrow for Backfilling Structures	CY	\$ 60	400	\$ 24,000.00
Prefabricated Bridge	LS	\$ 325,000	1	\$ 325,000.00
Highway Guardrail	LF	\$ 70	200	\$ 14,000.00
Asphalt overlay	TON	\$ 300	22	\$ 6,480.00
Erosion Control	FT	\$ 20	240	\$ 4,800.00
Signing and Pavement Markings	LS	\$ 10,000	1	\$ 10,000.00
Temporary Shoring/Control of Water	LS	\$ 75,000	1	\$ 75,000.00
Mobilization	LS	\$ 20,000	1	\$ 20,000.00
		Subtotal:		\$ 536,480.00
		Contingency: 25%		\$ 134,120.00

Design Services

Bridge/Highway Design:	\$	80,000.00
Survey:	\$	6,000.00
Permitting:	\$	12,000.00
Geotechnical:	\$	8,000.00
Hydraulic Report:	\$	9,000.00
Subtotal:	\$	115,000.00

Miscellaneous

Traffic Management and Detour	\$	10,000.00
Subtotal:	\$	10,000.00

Project Total: \$ 795,600.00
Total Conceptual Estimate: \$ 796,000.00

Additional Details on above items:

Design fee estimated based on percentage of construction cost.

Assumes all work can be performed within the right-of-way.

A contingency of 25% for unknowns has been provided.

Further design is needed and this estimate has been prepared for planning purposes.

Prepared by: ATB

Reviewed by: KGK

Town of Rowley Bridge and Culvert Evaluations:

Mill Road over Mill River (R-11-006)



Conceptual Cost Estimate

Scope of Work: Superstructure Replacement

Construction Costs

Items/ Description	Unit	Unit Cost	Quantity	Item Cost
Demolition (remove existing superstructure)	LS	\$ 17,000	1	\$ 17,000.00
Bridge Excavation	CY	\$ 60	180	\$ 10,800.00
Gravel Borrow for Backfilling Structures	CY	\$ 50	180	\$ 9,000.00
New Superstructure	LS	\$ 120,000	1	\$ 120,000.00
Highway Guardrail	LF	\$ 70	200	\$ 14,000.00
Asphalt overlay	TON	\$ 300	13	\$ 3,825.00
Erosion Control	FT	\$ 20	240	\$ 4,800.00
Substructure Repairs	LS	\$ 75,000	1	\$ 75,000.00
Signing and Pavement Markings	LS	\$ 5,000	1	\$ 5,000.00
Temporary Shoring/Control of Water	LS	\$ 25,000	1	\$ 25,000.00
Mobilization	LS	\$ 20,000	1	\$ 20,000.00
		Subtotal:		\$ 304,425.00
		Contingency: 25%		\$ 76,106.25

Design Services

Bridge/Highway Design:	\$	76,000.00
Survey:	\$	7,000.00
Permitting:	\$	10,000.00
Geotechnical:	\$	5,000.00
Hydraulic Report:	\$	4,000.00
Subtotal:	\$	102,000.00

Miscellaneous

Traffic Management (signage)	\$	5,000.00
Subtotal:	\$	5,000.00

Project Total: \$ 487,531.25
Total Conceptual Estimate: \$ 488,000.00

Additional Details on above items:

Design fee estimated based on percentage of construction cost.

Assumes all work can be performed within the right-of-way.

A contingency of 25% for unknowns has been provided.

Further design is needed and this estimate has been prepared for planning purposes.

Prepared by: ATB

Reviewed by: KGK

Town of Rowley Bridge and Culvert Evaluations:

Independent Street over Ox Pasture Brook



Conceptual Cost Estimate

Scope of Work: Culvert Replacement

Construction Costs

Items/ Description	Unit	Unit Cost	Quantity	Item Cost
Demolition (remove existing structure)	LS	\$ 6,400	1	\$ 6,400.00
Bridge Excavation	CY	\$ 60	80	\$ 4,800.00
Gravel Borrow for Backfilling Structures	CY	\$ 50	80	\$ 4,000.00
New Culvert and Wingwalls	LS	\$ 160,000	1	\$ 160,000.00
Highway Guardrail	LF	\$ 70	200	\$ 14,000.00
Asphalt overlay	TON	\$ 300	8	\$ 2,250.00
Erosion Control	FT	\$ 20	240	\$ 4,800.00
Signing and Pavement Markings	LS	\$ 5,000	1	\$ 5,000.00
Temporary Shoring/Control of Water	LS	\$ 25,000	1	\$ 25,000.00
Mobilization	LS	\$ 20,000	1	\$ 20,000.00
Subtotal:				\$ 246,250.00
Contingency: 25%				\$ 61,562.50

Design Services

Bridge/Highway Design:	\$ 45,000.00
Survey:	\$ 6,000.00
Permitting:	\$ 10,000.00
Geotechnical:	\$ 14,000.00
Hydraulic Report:	\$ 12,000.00
Subtotal:	\$ 87,000.00

Miscellaneous

Traffic Management (signage)	\$ 5,000.00
Subtotal:	\$ 5,000.00

Project Total: \$ 399,812.50
Total Conceptual Estimate: \$ 400,000.00

Additional Details on above items:

Design fee estimated based on percentage of construction cost.

Assumes all work can be performed within the right-of-way.

A contingency of 25% for unknowns has been provided.

Further design is needed and this estimate has been prepared for planning purposes.

Prepared by: ATB

Reviewed by: KGK

Conceptual Cost Estimates

Structure 21

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	24"	1	\$ 6,316.30	\$ 6,316.30

Contingency = 15% \$ 947.44

Total Cost = \$ 7,263.74

Say	\$ 7,300.00
------------	--------------------

Structure 27

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwalls	30"	2	\$ 8,160.74	\$ 16,321.48

Contingency = 15% \$ 2,448.22

Total Cost = \$ 18,769.70

Say	\$ 18,800.00
------------	---------------------

Structure 7

Item	Pipe Diameter	Unit	Unit Price	Cost
Remove debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say	\$ 2,900.00
------------	--------------------

Structure 12

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	24"	1	\$ 6,316.30	\$ 6,316.30
Rebuild Wingwall	24"	1	\$ 6,000.00	\$ 6,000.00

Contingency = 15% \$ 1,847.44

Total Cost = \$ 14,163.74

Say	\$ 14,200.00
------------	---------------------

Structure 18

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Heawall	24"	1	\$ 6,316.30	\$ 6,316.30

Contingency = 15% \$ 947.44

Total Cost = \$ 7,263.74

Say	\$ 7,300.00
------------	--------------------

Structure 20

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	24"	1	\$ 6,316.30	\$ 6,316.30

Contingency = 15% \$ 947.44

Total Cost = \$ 7,263.74

Say	\$ 7,300.00
------------	--------------------

Structure 24

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	30"	1	\$ 8,160.74	\$ 8,160.74

Contingency = 15% \$ 1,224.11

Total Cost = \$ 9,384.85

Say	\$ 9,400.00
------------	--------------------

Structure 31

Item	Pipe Diameter	Unit	Unit Price	Cost
Uncover inlet and outlet	N/A	1	\$ 1,000.00	\$ 1,000.00

Contingency = 15% \$ 150.00

Total Cost = \$ 1,150.00

Say	\$ 1,200.00
------------	--------------------

Structure 32

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	30"	1	\$ 8,160.74	\$ 8,160.74
Remove sediment	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 1,599.11

Total Cost = \$ 12,259.85

Say	\$ 12,300.00
------------	---------------------

Structure 38

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Headwall	24"	1	\$ 6,316.30	\$ 6,316.30
Remove trees	24"	1	\$ 1,500.00	\$ 1,500.00

Contingency = 15% \$ 1,172.44

Total Cost = \$ 8,988.74

Say	\$ 9,000.00
------------	--------------------

Structure 47

Item	Pipe Diameter	Unit	Unit Price	Cost
Remove trees	N/A	1	\$ 1,500.00	\$ 1,500.00
Reset stones	N/A	1	\$ 5,000.00	\$ 5,000.00
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 1,350.00

Total Cost = \$ 10,350.00

Say	\$ 10,400.00
------------	---------------------

Structure 1

Item	Pipe Diameter	Unit	Unit Price	Cost
Remove vegetation	N/A	1	\$ 1,500.00	\$ 1,500.00

Contingency = 15% \$ 225.00

Total Cost = \$ 1,725.00

Say	\$ 1,700.00
------------	--------------------

Structure 2

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00
Remove vegetation	N/A	1	\$ 1,500.00	\$ 1,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 4,375.00

Say	\$ 4,400.00
------------	--------------------

Structure 3

Item	Pipe Diameter	Unit	Unit Price	Cost
Rebuild Heawalls	30"	2	\$ 8,160.74	\$ 16,321.48
Clean debris from channel		1	\$ 2,500.00	\$ 2,500.00
Remove tree at downstream		1	\$ 1,000.00	\$ 1,000.00

Contingency = 15% \$ 2,973.22

Total Cost = \$ 22,794.70

Say	\$ 22,800.00
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Structure 4

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00
Remove vegetation	N/A	1	\$ 1,500.00	\$ 1,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 4,375.00

Say	\$ 4,400.00
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Structure 19

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say	\$ 2,900.00
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Structure 34

Item	Pipe Diameter	Unit	Unit Price	Cost
Repair Sidewalk, downstream side	N/A	1	\$ 5,000.00	\$ 5,000.00

Contingency = 15% \$ 750.00

Total Cost = \$ 5,750.00

Say	\$ 5,800.00
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Structure 45

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say	\$ 2,900.00
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Structure 46

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say	\$ 2,900.00
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Structure 48

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00
Remove vegetation	N/A	1	\$ 1,500.00	\$ 1,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 4,375.00

Say	\$ 4,400.00
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Structure 49

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say \$ 2,900.00

Structure 50

Item	Pipe Diameter	Unit	Unit Price	Cost
Clean channel of debris	N/A	1	\$ 2,500.00	\$ 2,500.00

Contingency = 15% \$ 375.00

Total Cost = \$ 2,875.00

Say \$ 2,900.00

Structure 13

Item	Pipe Diameter	Unit	Unit Price	Cost
Construct Headwalls	24"	2	\$ 8,160.74	\$ 16,321.48
HDPE Pipe	24"	1	\$ 600.00	\$ 600.00
Excavation and pavement		1	\$ 15,000.00	\$ 15,000.00

20 ft length

Contingency = 15% \$ 2,448.22

Total Cost = \$ 34,369.70

Say \$ 34,400.00

Town of Rowley Bridge and Culvert Evaluations:

Culvert Headwalls

Conceptual Cost Estimate

Scope of Work: Headwall Replacement



Construction Costs

Pipe Size	Excavation Cost	Backfill Cost	Concrete Cost	Subtotal (per Headwall)	Contingency	Total (per Headwall)
8"	\$ 101.48	\$ 101.48	\$ 2,160.00	\$ 2,362.96	15%	\$ 2,700.00
10"	\$ 112.59	\$ 112.59	\$ 2,560.00	\$ 2,785.19	15%	\$ 3,200.00
12"	\$ 123.33	\$ 123.33	\$ 2,980.00	\$ 3,226.67	15%	\$ 3,700.00
15"	\$ 139.26	\$ 139.26	\$ 3,640.00	\$ 3,918.52	15%	\$ 4,500.00
18"	\$ 155.56	\$ 155.56	\$ 4,360.00	\$ 4,671.11	15%	\$ 5,400.00
21"	\$ 175.19	\$ 175.19	\$ 5,240.00	\$ 5,590.37	15%	\$ 6,400.00
24"	\$ 188.15	\$ 188.15	\$ 5,940.00	\$ 6,316.30	15%	\$ 7,300.00
30"	\$ 220.37	\$ 220.37	\$ 7,720.00	\$ 8,160.74	15%	\$ 9,400.00

Calculation of quantities taken from MassDOT Construction Standards E206.4.1

Unit costs taken from historic MassDOT bid data.

Project:
Location: Rowley, MA
Calculated by: ATB
Checked by:
Title: Preliminary Estimate

Project #: 14361.00
Sheet: 2 of 4
Date: 2-25-19
Date:



140. BRIDGE EXCAVATION CY

Note: Assume 1' outside wingwalls

Excavation for Required to repair headwalls (2:1 slope)

Pipe Dia.	CF	CY	Cost
8 in	27.4	1.0	\$ 101.48
10 in	30.4	1.1	\$ 112.59
12 in	33.3	1.2	\$ 123.33
15 in	37.6	1.4	\$ 139.26
18 in	42	1.6	\$ 155.56
21 in	47.3	1.8	\$ 175.19
24 in	50.8	1.9	\$ 188.15
30 in	59.5	2.2	\$ 220.37

From MassDOT Weighted Bid Prices for Item No. 140., use \$40.00/CY

Use \$100 since excavation is such a small quantity

Unit Cost = \$ 100.00 /CY

Project:
Location: Rowley, MA
Calculated by: ATB
Checked by:
Title: Preliminary Estimate

Project #: 14361.00
Sheet: 3 of 4
Date: 2-25-19
Date:



XXXX

GRAVEL BORROW

CY

Note: Assume 1' outside wingwalls

Excavation for Required to repair headwalls (2:1 slope)

Pipe Dia.	CF	CY	Cost
8 in	27.4	1.0	\$ 101.48
10 in	30.4	1.1	\$ 112.59
12 in	33.3	1.2	\$ 123.33
15 in	37.6	1.4	\$ 139.26
18 in	42	1.6	\$ 155.56
21 in	47.3	1.8	\$ 175.19
24 in	50.8	1.9	\$ 188.15
30 in	59.5	2.2	\$ 220.37

From MassDOT Weighted Bid Prices for Item No. 140., use \$40.00/CY

Use \$100 since excavation is such a small quantity

Unit Cost = \$ 100.00 /CY

Project:
Location: Rowley, MA
Calculated by: ATB
Checked by:
Title: Preliminary Estimate

Project #: 14361.00
Sheet: 4 of 4
Date: 2-25-19
Date:



901. 4000 PSI, 1.5" 565 CONCRETE CY

Concrete Required to replace each headwall (2:1 slope)

Pipe Dia.	CY	Cost
8 in	1.1	\$ 2,160.00
10 in	1.3	\$ 2,560.00
12 in	1.5	\$ 2,980.00
15 in	1.8	\$ 3,640.00
18 in	2.2	\$ 4,360.00
21 in	2.6	\$ 5,240.00
24 in	3.0	\$ 5,940.00
30 in	3.9	\$ 7,720.00

From MassDOT Weighted Bid Prices for Item No. 901., use \$2000.00/CY (due to small quantity)

Unit Cost = \$ 2,000.00 /CY